FINAL TECHNICAL REPORT

SOUTH CENTRAL COAST
BEACH ENHANCEMENT PROGRAM
CRITERIA AND CONCEPT DESIGN

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EXECUTIVE SUMMARY

The Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) is a California joint-powers agency, which deals with coastal erosion and beach problems on the California south central coast. In this report, BEACON proposes a program to pursue opportunities for obtaining suitable material for placement at six beach sites. The project purpose is for renourishing a denuded littoral cell, erosion control, and recreational benefits. The six beach fill sites are Goleta Beach, Ash Avenue, Oil Piers, Surfer's Point, Oxnard Shores, and Hueneme Beach.

The primary objective of the program is to obtain a 5-year permit from all necessary regulatory agencies to allow the opportunistic beach-quality material to be placed on the beach fill sites without the need for individual project permits. State and Federal agencies with permit authority for beach fill projects are concerned with public health and welfare, and the effect of potentially toxic components, sedimentation, turbidity, and potential impacts to the environment. Resource agency concerns regarding the characteristics of beach fill include chemical compatibility, sediment grain size, color, particle shape, compactability and moldability, placement site and timing, and placement rate.

Each of the six beach fill sites and their site specific design criteria are listed in the table below. The table outlines the volume of material per year and per season, grain size of acceptable materials, and beach fill designs which may be suitable for each site. Each of the six beach fill sites have unique characteristics including location relative to environmental resources and wetland outlets, beach usage, and beach profile configuration.

Placement Site	Percent Fines Allowed	Maximum Quantities (cy) Per Season		Maximum Annual Total Quantity	Beach Fill Designs Proposed
		Fall/ Winter	Spring/ Summer		
Goleta Beach	25%	100,000	0	100,000	Below MHT, Beach Berm, & Sand Dike
Ash Avenue	25%	100,000	0	100,000	Below MHT, Beach Berm, & Sand Dike
Oil Piers	35%	183,300	91,700	275,000	Below MHT, Beach Berm, & Sand Dike
Surfer's Point	35%	116,700	58,300	175,000	Below MHT & Beach Berm
Oxnard Shores	35%	250,000	0	250,000	Below MHT, Beach Berm, & Sand Dike
Hueneme Beach	35%	250,000	0	250,000	Below MHT & Beach Berm

Potential stockpile sites exist within the project area. The stockpile sites are identified as temporary storage sites of suitable beach sand until an appropriate time and approval has been obtained for placement at a beach fill site. These sites include: (1) the terminus of Ward Drive,

near Goleta Beach; (2) Santa Monica Creek Debris Basin Site near the Ash Avenue Site; (3) two Caltrans stockpile sites inland of Highway 101 along the railroad near Oil Piers; (4) Ventura County Fairgrounds property adjacent to the Surfer's Point beach fill site; (5) on the back of the beach near Fifth Street at Oxnard Shores; and (6) on the lighthouse promenade near Hueneme Beach. Additional sites may be identified over time as the program proceeds.

Potential sand sources have been identified as part of the program, including flood control debris basins, river and slough sediments, landslide material, decommissioned dams, and material from miscellaneous construction activities. Criteria for beach fill sand sources are specified to enable BEACON to implement individual projects in accordance with environmental guidelines established by the State and Federal government. These criteria include chemical testing, sediment grain size, color, particle shape, debris, and compactability/moldability. Each source of potential beach sediment will be analyzed against each of these criteria to determine if the sediment is beach compatible and which beach fill site should receive it.

Beach fill activities may occur on short notice and when material becomes available. Transportation of the sediment will be by trucks, train, dredge, conveyors, or other suitable means. Trucking of suitable beach sand from potential sand sources will probably be the most efficient transportation method for most sand source sites. However, other transportation methods may be adequate for certain sites or specific operations.

Both physical and biological monitoring are proposed as part of this program. A detailed biological assessment was conducted by the Chambers Group, Inc. for each of the six beach fill sites and is included in Appendix B. Each project site possesses different environmental resources therefore, each beach fill site will have its own monitoring program tailored to address them. Physical monitoring will be conducted at each of the beach fill sites and will include beach profiling and turbidity monitoring. The table below summarizes the proposed monitoring activities for each site.

Placement Site	Kelp	Reef	Eelgrass	Grunion	Turbidity	Beach Profile
Goleta Beach	X		X		X	X
Ash Avenue	X	X			X	X
Oil Piers	X	X		X	X	X
Surfer's Point					X	X
Oxnard Shores				X	X	X
Hueneme Beach					X	X

1.0 INTRODUCTION

The Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) is a California joint powers agency established to deal with coastal erosion and beach problems on the south central coast of California. BEACON's member agencies include the Counties of Santa Barbara and Ventura and the Cities of Port Hueneme, Oxnard, San Buenaventura, Carpinteria, and Santa Barbara. BEACON proposes to implement a program to actively pursue opportunities for obtaining suitable material for placement at six beach sites for renourishment of a denuded littoral cell, erosion control, and recreational benefits. The six beach enhancement sites are shown in Figure 1-1 and Figure 1-2 and include Goleta Beach, Ash Avenue, Oil Piers, Surfer's Point, Oxnard Shores, and Hueneme Beach.

1.1 BACKGROUND

Santa Barbara and Ventura County beaches have been receding for many years. Coastal erosion is a natural process that can be aggravated by man-made features such as harbors, upland development, and flood control structures. These features interfere with the migration of sediment along the coast or delivery from rivers and creeks. It has been well documented that the construction of Santa Barbara harbor has a significant effect on the movement of sediment along the coast. Sediment supply to the littoral cell is reduced by upland development, resulting in the continuing erosion of the beaches and coastal bluffs. Sediment carried by creeks and rivers to the ocean is also intercepted by man-made structures such as flood control debris basins and dams (BEACON 2000).

The beaches along this reach have a deficit of sand supply. For example, at Carpinteria, the deficit is approximately 75,000 cubic yards (cy) per year, and from the Ventura River to the Ventura Harbor it is 200,000 cy per year (USACE 1997). A deficit of 450,000 cy per year was estimated east of the Santa Clara River mouth as a result of reduced sand delivery (Noble Consultants, Inc. 1989). Also, beach retreat has been documented at upcoast areas such as Goleta Beach.

Fill material placed on a beach can help nourish eroding shores. Opportunistic beach fill is material which becomes available as a surplus from construction projects, and is therefore available at little to no cost compared to the cost of material commonly used for beach enhancement or nourishment. Examples of opportunistic beach fill include the byproducts of flood control projects, transportation projects, dam removal activities, wetland restoration, harbor and channel dredging, and excavation for upland development.

Flood control projects include "cleanout" of flood control debris basins and maintenance of flood control channels and rivers. Flood control debris basins are very effective at reducing the debris loads associated with flood flows. Unfortunately, sediments that would otherwise be transported

to the ocean by creeks and rivers, which would ultimately replenish the beaches, are trapped in debris basins and frequently disposed of upland. This "short-stopping" of sediment also occurs in several creeks and estuaries where the grade is too small to support transport (BEACON 2000).

An example of material generated from flood control maintenance projects was exhibited in 1995, after a series of storm events. On January 10, 1995, a very strong storm in Santa Barbara County filled 16 debris basins and the Goleta Slough in less than 12 hours. Over 400,000 cy of sediment was deposited in the 16 debris basins. An additional 200,000 cy of sediment was deposited in the Goleta Slough. Similar flooding and sedimentation occurred exactly two months later on March 10, 1995. Efforts were made to immediately remove the debris and sediment. The Santa Barbara County Flood Control District (SBCFCD) already had a program in place for removing sediment from the Goleta Slough with a hydraulic dredge and discharging the sediment into the surf zone. The hydraulic dredge could not remove all the storm sediment in a timely manner so the large volumes were removed by cranes and stockpiled nearby. With several hundred thousand cubic yards of storm sediment available, the SBCFCD decided to dispose of the material at the beach. By the end of April 1995, approximately 400,000 cy of sediment had been pushed into the surf zone at Goleta Beach (BEACON 2000).

1.2 PROGRAM PURPOSE

The program is designed to capitalize on opportunities to obtain beach-quality sand as surplus material from upland sources (opportunistic sand) as described above. The purpose of the program is to streamline the permit process for implementing beach-fill projects and:

1. Renourish the Santa Barbara Littoral Cell;

2. Improve protection to coastal structures; and

3. Enhance recreational opportunities.

The primary objective of the program is to obtain a 5-year permit from all necessary regulatory agencies to allow opportunistic beach enhancement projects to occur within the 5 years, eliminating the need for individual permits for each project. The permitting agencies include the U.S. Army Corps of Engineers (USACE), California Coastal Commission (CCC), California Regional Water Quality Control Board (RWQCB), State Lands Commission (SLC), State Department of Parks and Recreation, and the County of Santa Barbara. In addition, permits may be required from the individual cities for each beach fill placement project, which may include grading, encroachment, and trucking permits. The program would help to alleviate the staff workloads of public agencies. The permits would allow beach fills to occur based on a pre-determined set of criteria that each project would have to meet. The criteria would include chemical characteristics of the sand, grain size, color, particle shape, debris content, compactability/moldability, placement sites, placement timing, and placement rates.

These agencies and other local, state, and federal agencies have been contacted regarding this program, and a literature review has been conducted. The view of some of the resource agencies are as follows: The USACE and the U.S. Environmental Protection Agency (USEPA) consider beach fill to be a beneficial use of dredged material as stated in their *Inland Testing Manual*

(ITM) (USEPA and USACE 1998). They note the vast majority of dredged material is chemically compatible for use in beneficial applications. Beach fill is also considered a beneficial use of suitable upland material (Russ Kaiser, USACE, Personal Communication, 2000). Proposed dredged beach fill material often is not required to undergo chemical or biological testing, if grain size and contamination information indicates compatibility. The focus of public agencies (USACE, USEPA, RWQCB, and CCC) tends to be on grain-size compatibility, placement timing, and contaminants. Because material from upland sites has experienced different environmental and human influences than dredged material, it may require different testing considerations for a suitability determination.

The permits would provide BEACON and its member agencies with a certain degree of discretionary authority to approve appropriate projects with notification to the USACE, and concurrence from permit agencies for each project. Discretionary approval would still be retained by the permit agencies for projects not meeting all of the specified criteria, or possessing characteristics outside of specified limits. At no time would permit agencies be expected to relinquish entire discretionary approval; they would always have the option to require an individual permit for a project. As part of the program, BEACON proposes to notify each agency of a pending project and request concurrence within approximately 30 days prior to construction of each project.

1.3 PURPOSE OF THIS REPORT

The purpose of this report is to provide technical criteria for the South Central Coast Beach Enhancement Program, provide conceptual beach fill designs, and identify potential sand sources and sand transport modes. The report recommends specific criteria for material suitability based on grain size, chemical characteristics, color, and other properties. It recommends specific placement locations, rates, and timing to proactively minimize environmental impacts. Monitoring of beach fill projects is also recommended. One program goal is to maximize the benefits of the beach enhancement activities with environmental sensitivity.

Technical considerations for the placement of beach fills are:

1. Chemical and biological constituents of beach fill;
2. Grain sizes (beach fills may consist of mostly sand with a range of cobble-gravel-sand-silt-clay; special emphasis is placed on analyzing silt and clay fractions which may increase turbidity, contain chemicals, and cover offshore reefs);
3. Color (mainly an aesthetic consideration and usually not a critical factor if the material is placed below the mean high tide line);
4. Particle shape (angular or sharp particles can detract from the comfort of beach users);
5. Debris content (the beach fill must not contain litter, trash, or significant quantities of organics);
6. Compactability/moldability of proposed beach fill (the material must not possess the tendency for hardpan formation);

7. Geographic location of placement;

8. Timing of placement (the timing of placement is controlled to minimize impacts to beach use, wildlife feeding habits, and grunion spawning);

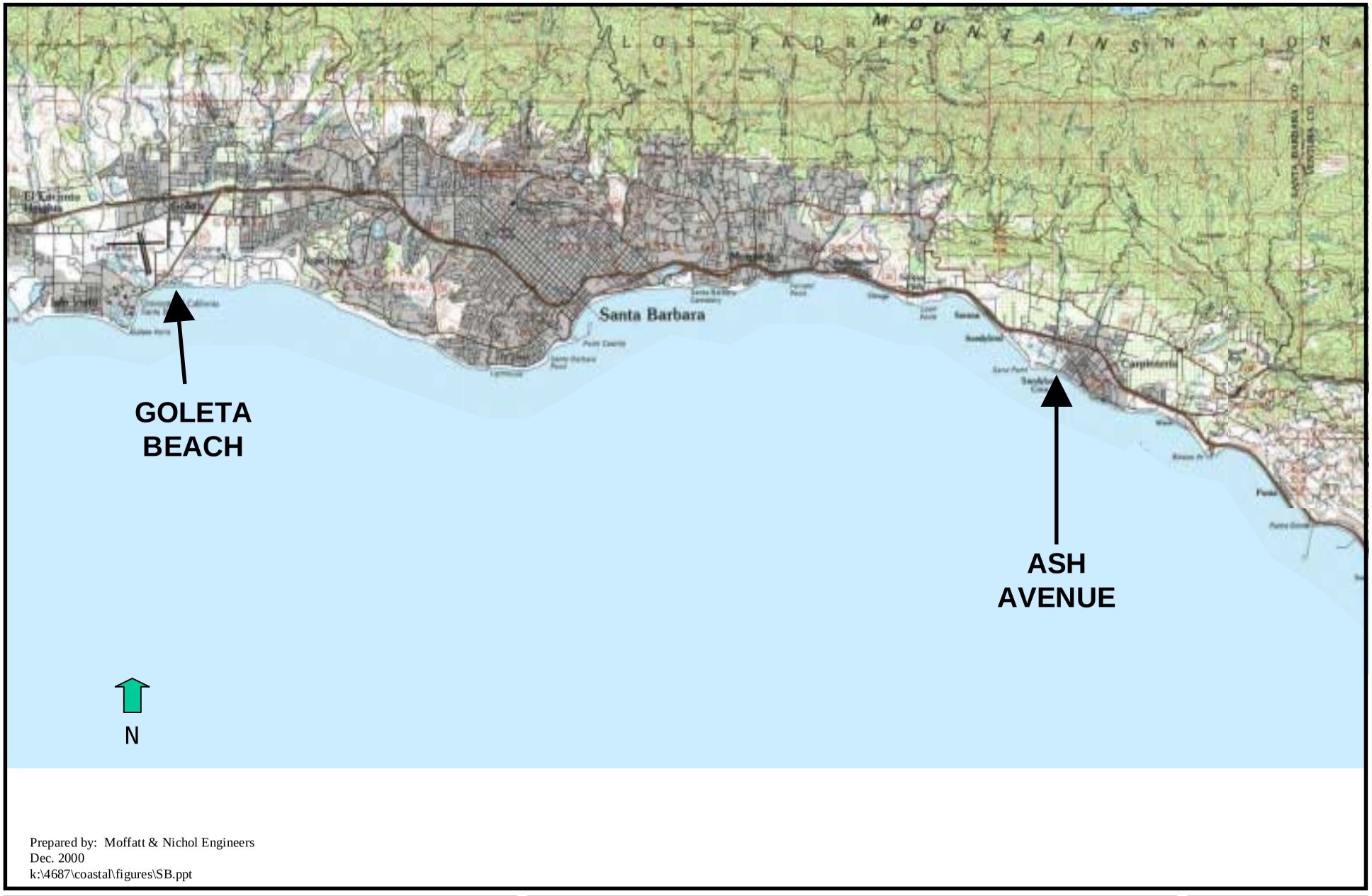
9. Controlled rate of placement or application to the surf zone to minimize turbidity;

10. Elevation of placement (either in-water or above-water on the beach, depending on season, ocean conditions, material characteristics, and the existence of sensitive resources);

11. Geometry of placement (including berm elevation, foreshore slope, shoreline advance distance, and plan configuration of the placed material); and

12. Monitoring (program effects can be determined through monitoring).

Considerations 1 through 9 are addressed in Sections 2.0 (Agency Concerns) and Section 4.0 (Sand Sources), Items 10 and 11 are addressed in Section 3.0 (Beach Fill Characteristics and Conceptual Design), and Item 12 is discussed in Section 5.0 (Monitoring). In addition, potential sand sources are identified in Section 4.0 (Sand Sources) and Future Actions by BEACON in Section 6.0 (Future Actions).



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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Locations of Proposed Beach Fill Sites in Santa Barbara County	Figure 1-1

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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Locations of Proposed Beach Fill Sites in Ventura County	Figure 1-2

2.0 AGENCY CONCERNS

State and Federal agencies with permit authority for beach fill projects are concerned with public health and welfare, and the effect of potentially toxic components, sedimentation, turbidity, and potential impacts to the environment. Resource agency concerns regarding the characteristics of beach fill are summarized below. BEACON proposes to address each concern. Specific actions proposed by BEACON are presented in Section 4.0 of this report.

2.1 CHEMICAL COMPATIBILITY

Chemical compatibility of beach fill with the receiving beach is required to minimize adverse effects to human health. The chemical content of material is evaluated through background research and testing. The need for chemical testing is based on whether the resource agencies have "reason to believe" that the material is contaminated (USEPA and USACE 1998). As an example, material is considered most likely to be free of contaminants if it is composed of sand, gravel, or other inert material, and is found in areas of high current or wave energy. Isolation of the material from sources of contamination, based on previous testing and information about past land uses at the source location may be utilized to conclude there is no "reason to believe" contaminants are present. Chemical and biological contamination of sediments is addressed in detail in the ITM (USEPA and USACE 1998). The ITM does not address terrestrial soils in as much detail as it addresses dredged materials. BEACON proposes bulk chemistry testing of sand sources prior to their use. The sampling and testing strategy is discussed Section 4.2.1 of this report.

2.2 SEDIMENT GRAIN SIZE

Analysis of the sediment grain size of potential beach-fill material helps to determine impacts on the receiving environment. Reef habitat, bottom-dwelling organisms, and kelp may become covered when sediment settles from suspension. Also, contaminants tend to adhere to fine sediment grains. Acceptable grain-size criteria and effects of turbidity caused when silt and clay are suspended in the water column are covered only in more general terms in the ITM. The acceptable percent fines (silt and clay) in beach fill is not specified, but the USACE generally requires beach fill to contain a fines fraction that is within 10% of the sand at the placement location (Russ Kaiser, USACE, Personal Communication, 2000).

Internal USACE guidelines (1989) to determine the acceptable fines content for Federal projects is relevant to this discussion, and is based on matching the gradation of the native sediment within a certain percentage on the beach and out to a depth of -30 feet mean lower low water (MLLW). The USACE method was devised internally for their dredging and beach replenishment projects and is not necessarily applicable to this program, but it presents background of a relevant analysis approach.

Coarser sands typically remain on the beach longer and therefore provide wider beaches than finer sands. Coarser sands are often considered better for use as beach fill because of the improved protection and retention characteristics they provide for the cost incurred. Coarser sands will also form steeper equilibrium beach slopes at receiving beaches than finer sands. Steep beach slopes can be considered less desirable than flatter beach slopes by some user groups, but they generally do not create other types of adverse conditions. BEACON proposes use of beach fill material that meets grain size criteria, as discussed in detail in Section 4.0 of this report.

2.3 COLOR

Resource agencies have been less concerned about material color in the past because of more extensive use of dredged material for historic beach fill rather than upland material. Dredged material typically is a darker color than the receiving beach initially, then is washed and reworked by waves and eventually "bleaches out" under exposure to the sun and marine environment resulting in sand very similar in appearance to the receiving beach. Resource agencies have informally indicated that the only criteria for color is to reasonably match the color of the receiving beach after reworking by waves for aesthetic reasons. Strong public reaction occurred when red-colored sand was placed over the white sand beach at Ponto Beach in Carlsbad, California in 1996. Responsible agencies wish to avoid an unnecessary public controversy. The CCC has conditioned approval of a beach fill project in Seal Beach in the past on determination of the suitability of materials based on criteria defined in a Sand Characterization Study (Moffatt & Nichol Engineers 1994). The study indicated that beach fill material should possess similar sediment grain size and color as the receiving beach.

2.4 PARTICLE SHAPE

Use of natural sand rather than manufactured sand is considered more appropriate for beach fill. Natural sand consists of rounded particles rather than sharp or angular particles. Natural sand is carried downstream in rivers where fluvial transport causes wearing and rounding of particle edges through abrasion.

2.5 DEBRIS

It is assumed that opportunistic sand will be free of trash and debris when placed on the beach. Debris content should be addressed considering the source location of material and past land uses on and around the site. Debris should definitely not constitute any substantial portion of beach fill because of possible health and safety hazards posed by such materials and the possible nuisance odors and visual impacts associated with their presence. Debris should be separated from the sand at the source. BEACON proposes to visually determine whether debris screening the material is necessary, and if so, to screen it at the source location as discussed in Section 4.0 of this report.

2.6 COMPACTABILITY/MOLDABILITY OF PROPOSED BEACH FILL

The behavior of beach fill under repeated wetting and drying conditions if placed high on the subaerial beach above the reach of the tides, and after becoming semi-compacted during placement is important in determining material suitability. Material that does not tend to harden

or form a crust that would prevent reworking by waves is desirable. Certain types of fill may form a hardpan when exposed to the environment. The USACE has indicated that this property is not acceptable for beach fill if placed high on the subaerial beach, and that if the material tends to possess this property, that it be mixed with other suitable material or existing beach sand to minimize the hardening effect (Russ Kaiser, USACE, Personal Communication, 2000). BEACON proposes to place this type of material directly within the reach of the tides and waves to prevent formation of a hardpan.

2.7 PLACEMENT SITE AND TIMING

The placement location and timing of beach fill operations has been considered a significant factor by the USACE in Section 404(B)(1) Guidelines, and by the CCC in conditioning permits for recent projects. Agencies typically specify that placement of the material should occur away from sensitive resources (least tern and snowy plover foraging activities), should not occur during grunion runs and least tern or snowy plover nesting, should not occur at public beaches during particularly high-use times, and should not be constructed in a manner to interrupt beach access. These considerations were taken into account when designing this program and it was proactively designed to be as environmentally sensitive as possible with restrictions as to placement locations and timing.

2.8 PLACEMENT RATE

Beach fill placement rates have been restricted by the USACE on previous beach fill projects to control turbidity levels. Controlled or limited beach fill placement rates may also extend the sand placement period and the period of turbid conditions. The restriction has been applied to dredging projects and is expressed as a quantity of sand placed per year or month. Such restrictions have been imposed on projects located at sites possessing sensitive species.

Limiting the placement rate will also limit the number of trips required to transport the material per day. The number of trucks must be controlled to minimize adverse impacts to air quality, traffic and circulation, public safety, and noise. BEACON proposes to restrict the placement rate of material to proactively address the turbidity issue as discussed in Section 4.0 of this report.

3.0 PROPOSED BEACH FILLS AND CONCEPTUAL DESIGNS

This section describes each of the six beach fills and their respective designs. The descriptions of proposed beach fills outline the site-specific information of each beach fill including volume of material, grain size of acceptable materials, beach fill designs which may be suitable for each site, and sand placement rate and timing. Each of the six beach fill sites have unique characteristics including location relative to environmental resources and wetland outlets, beach usage, and beach profile configuration. Therefore, each site will be described independently.

3.1 GOLETA BEACH

The Goleta Beach fill site (Figure 3-1) is located in the Goleta Beach County Park at 5986 Sandspit Road, Goleta in Santa Barbara County. Goleta is located north of the City of Santa Barbara. The County Park provides numerous recreational activities including swimming, sunbathing, surfing, fishing from the Goleta Pier, boating, a children's playground, and dining at the Beachside Café and snack bar. The Park also includes several public restrooms, parking areas, structures used for storage of Park equipment and vehicles, and residential structures that are occupied by the Park rangers.

The Southern California Gas Company maintains natural gas processing, distribution, and storage facilities on the property located east and north of the site. Also, northwest of the site the Santa Barbara Municipal Airport is maintained by the City of Santa Barbara. West of the site, the land is developed with facilities and structures associated with the University of California at Santa Barbara. South of the site is the Pacific Ocean. The Goleta Beach fill site is located west of the Goleta Slough. During wet weather episodes, the Slough discharges into the Pacific Ocean and is a source of sediment to the littoral cell. Recently, this site has experienced serious erosion and a temporary rock revetment was constructed to protect the upland area. This rock revetment was removed in November 2000 and a winter sand dike was constructed to offer protection to the upland area.

3.1.1 Proposed Quantity and Quality of Beach Fill Material

The plan view of the proposed Goleta Beach fill is shown in Figure 3-2. The plan shows a beach fill length of approximately 2,200 feet extending east to the pier. The volume of material proposed for this site is approximately 100,000 cy per year. The maximum volume at this site was determined by analyzing the beach profile configuration and designing a "best-fit" beach fill on the existing profile with consideration of environmental resources. The "best-fit" beach fill design starts near the MLLW elevation, with a 10:1 or 15:1 slope to an elevation slightly lower than the back beach, then a flat berm surface to the existing back beach. This outlines the cross-section of the beach fill and is applied to the distance of the beach fill to calculate a volume.

Sediment samples were collected along two transects at each of the beach fill sites. The samples were collected on the beach and out to a depth of 30 feet (Figure 3-2) to characterize the native beach gradation. The samples were analyzed for grain size and the results are contained in Appendix A. The median grain size (D_{50}) for the composite sample is 0.144 mm, with a fines content of 13% (passing the #200 sieve). The offshore portion of the profile contains the highest percentage of fines. The samples taken at depths between –18 and –30 feet ranged from 18 to 39% fines. These existing data indicate a relatively high percentage of fines offshore. Although these fines exist, sensitive resources (offshore reefs and kelp beds) also exist offshore and downcoast of the beach fill site. Fine-grained particles tend to settle offshore in the vicinity of these resources. In order to minimize the volume of fines that may adversely impact the reef and kelp beds, beachfill with up to 25% fines is proposed at the Goleta Beach fill site.

3.1.2 Design Scenarios

The beach fill material will be placed either below the mean high tide line, as a layer over the beach surface as a berm, or as a dike along the revetment or back of the beach. One or more of these design scenarios may be used at the same time depending on site conditions. Beach fill concepts are described below.

Below Mean High Tide Line

Beach fill will be placed below the mean high tide line if the material is darker colored and finer grained than the existing beach sand. Sand will be delivered to the beach and pushed by bulldozers to the water's edge. At low tide, the material will be pushed as far seaward as possible and left in a low berm below the existing berm so that it can be reworked by waves during the following rising tide. The fines will be gradually winnowed out of the material by waves and currents, carried offshore, and sand will be left behind.

Beach Berm

Beach fill may be placed as a layer over the existing beach as a berm. The beach-berm concept at Goleta Beach is shown in Figure 3-3. More discussion of the concept of design profiles versus natural profile evolution is presented in Section 3.7. The berm would be a level surface extending a certain distance from the back of the beach toward the ocean, then sloping gradually into the water. The elevation, width, length, and slope of the berm will vary for each sand placement opportunity, depending upon the quantity of material to be placed, its qualities and the condition of the beach at the time. Figure 3-3 shows the maximum proposed berm width over the existing profile (maximum envelope) for the maximum amount of material at the site (100,000 cy/yr). All projects will fall within this envelope.

A typical berm at the Goleta Beach site for the maximum volume proposed would be elevated to near +12 feet above mean lower low water (MLLW) and extended 75 feet seaward, then sloped at 10:1 (horizontal to vertical) to the water. The length of the beach fill may extend up to 2,200 feet.

Sand Dike along the Back of Beach

Sand could also be placed as a dike along back of the beach if appropriate. The sand dike concept could be constructed if BEACON chose to apply the sand to the sea more gradually than would otherwise occur to reduce turbidity or if the County desires to use the material to create a winter dike at this site. The material would be piled up along the back portion of the beach. The dike would be narrower and longer than the beach berm concept. A typical dike would reach up to +15 feet MLLW, be only 20 to 30 feet wide, and slope more steeply to the beach at approximately 5:1 (H:V).

This design scenario could be useful if material is high in fines content and the turbidity needs to be more controlled. Instead of transporting material to a stockpile site to wait until such a time that turbidity is less of an issue, the material could be placed as a sand dike along the back of the beach where it would disperse in the water more slowly during extreme high tides. This design scenario could make beach placement feasible without the high cost of double handling to a stockpile site and back to the beach.

3.1.3 Timing and Placement Rate

Placement at Goleta Beach is limited to Fall-Winter placement only (i.e., between September 15 and March 15). The high-use of this beach site during the summer months by beach goers prohibits beach fill placement and construction during this time. The rate of sand placement is derived from many factors including environmental factors, truck access, and seasonal conditions. Table 3.1 outlines the yearly placement limits for each site.

3.2 ASH AVENUE (CARPINTERIA BEACH)

The Ash Avenue beach fill site is located in the City of Carpinteria. Carpinteria is located in Santa Barbara County (Figure 3-4), south of the City of Santa Barbara. Ash, Holly, Elm, and Linden Avenues provide beach access to the Carpinteria City Beach. A concessionaire who rents kayaks and other beach related items is located at the Ash Avenue access point. Recreational activities at Ash Avenue beach fill site include swimming, sunbathing, surfing, kayaking, scuba diving, and fishing. The Ash Avenue beach fill site is bordered by Carpinteria State Beach to the east, the Pacific Ocean to the south, residential homes to the north and west, and the Carpinteria Marsh inlet to the far west. During wet weather episodes, the Marsh discharges into the Pacific Ocean and contributes sediment to the littoral system.

3.2.1 Proposed Quantity and Quality of Beach Fill Material

The plan view of the proposed Ash Avenue beach fill is shown in Figure 3-5. The plan shows a beach fill beginning approximately 1,000 feet south of the Carpinteria Marsh inlet and extending approximately 2,400 feet south to Linden Avenue. The maximum annual volume of material proposed for this site is approximately 100,000 cy. Also, the beach fill is positioned 1,000 feet south of the Carpinteria Marsh inlet to minimize potential impacts to the Carpinteria Reef located just offshore of the marsh inlet if material moved offshore as the beach profile adjusts towards equilibrium.

Sediment samples collected at the Ash Avenue site show the median grain size (D_{50}) for the composite sample is 0.195 mm with a fines content of 5% (passing the #200 sieve). However, it is important to note that over 30% passed the #100 sieve which is 0.149 mm. The highest percentage of fines is located in the offshore region of the beach profile with 43% fines at -24 feet MLLW. The Carpinteria Reef exists upcoast and offshore of the beach fill site. Although a relatively high percentage of fines exist offshore at the site, in order to limit the volume of fine-grained material which may adversely impact the reef, beachfill with up to 25% fines is proposed for this site. A cobble sample was also collected indicating that the native beach has a wide gradation and therefore, should be more likely to accept a wide range of material.

3.2.2 Design Scenarios

The beach fill material will be placed below the mean high tide line, as a layer over the beach surface as a berm, or as a sand dike along the revetment or back of the beach as described in Section 3.1.2. The beach-berm concept is shown in Figure 3-6. A typical berm at the Ash Avenue beach fill site would be elevated to near +10 feet above MLLW and extended 175 feet seaward, then sloped at 10:1 (horizontal to vertical) to the water. At this site, the elevation is limited to +10 feet because the back beach has an elevation of only +10.7 feet MLLW.

3.2.3 Timing and Placement Rate

Placement at the Ash Avenue beach fill site is also limited to Fall-Winter placement (i.e., between September 15 and March 15) because of the high use of this beach site during the summer months. The rate of sand placement is derived from many factors including environmental factors, truck access, and seasonal conditions (Table 3.1).

3.3 OIL PIERS

The beach fill site referred to as Oil Piers is located in northern Ventura County along Highway 101 (Figure 3-7). The name Oil Piers is in reference to the recently removed Mobil Oil piers. The beach is backed by a high rock revetment and a bluff. The Oil Piers site is currently used for recreational purposes including surfing, swimming, boating, and sunbathing. Historically, Oil Piers was a well-known surfing spot, however since removal of the piers, this spot is not surfed as heavily. Beach access is provided along an access road that runs parallel to the Pacific Ocean and via pedestrian underpasses under Highway 101, from large dirt parking lots.

3.3.1 Proposed Quantity and Quality of Beach Fill Material

The plan view of the proposed Oil Piers beach site is shown in Figure 3-8. The plan shows a beach fill length of approximately 4,000 feet beginning approximately 2,000 feet south of Punta Gorda (La Conchita Point). The maximum annual volume of material proposed for this site is approximately 275,000 cy.

Sediment samples collected at this site indicate the median grain size (D_{50}) for the composite sample is 0.18 mm with a fines content of 13%. From –24 to –30 feet, the percentage of fine-grained sand (passing the #200 sieve) ranged from 22 to 69%. Therefore, beach fill with up to

35% fines is proposed for this site since there are minimal environmental constraints on grainsize and it is consistent with the natural fines content.

3.3.2 Design Scenarios

The beach fill material will be placed below the mean high tide line, as a layer over the beach surface as a berm, or as a sand dike along the revetment as described in Section 3.1.2. The beach-berm concept is shown in Figure 3-9. The typical berm would be elevated to near +12 feet above MLLW and extended 125 feet seaward, then sloped at 10:1 (horizontal to vertical) to the water. The high revetment located on the back of the beach allows for a higher berm elevation.

3.3.3 Timing and Placement Rate

Placement at the Oil Piers beach fill site is proposed for both Fall-Winter and Spring-Summer placement (summer placement is between March 15 and September 15). It is proposed that two-thirds of the sand can be placed during the winter months and one-third during the summer. This allows for the sand to be introduced to the littoral cell similarly to the natural seasonal variations. Since the winter season usually brings higher storms and rains, more sediment is transported to the littoral cell from rivers, streams, and other watershed sources than during the summer months. Therefore, the rate of sand placement for the 275,000 cy per year maximum annual limit is 183,300 cy during the winter and 91,700 during the summer. This is outlined further in Table 3.1 for each site.

3.4 SURFER'S POINT

The Surfer's Point beach fill site is located within Seaside Park, in the City of San Buenaventura in Ventura County (Figure 3-10). It is a beach that is heavily used by surfers due to direct exposure to ocean swell. The beach along Surfer's Point is characterized by large cobbles and a thin sand cover. Surfer's Point beach fill site is bordered by the Ventura River to the northwest, the Pacific Ocean to the south, the Ventura County Fairgrounds to the northeast and Promenade Park to the southeast. Recreational activities include surfing, windsurfing, sunbathing, swimming, walking, and biking. A bike path leads along Seaside Park to the Ventura Pier. The Surfer's Point Cobble Nourishment Project was recently constructed with approximately 8,000 cy of cobble and sand (60% cobble, 40% sand) from the Ventura River upstream of the Santa Ana Bridge. The Surfer's Point beach fill site is located immediately southeast of the Ventura River mouth. This river is a source of sediment to the littoral cell, especially during wet weather episodes.

3.4.1 Proposed Quantity and Quality of Beach Fill Material

The plan view of the Surfer's Point beach fill site is shown in Figure 3-11. The plan shows a beach fill length of approximately 2,800 feet beginning just east of the Ventura River mouth and extends south along Seaside Park. The annual volume of material proposed for this site is approximately 175,000 cy assuming the material is primarily sand. If the material is primarily cobble, a smaller quantity of material will be placed on the beach and will be limited to the far west end of the site (not to Figuroa Street). The annual quantity limit represents the high-end, worst case for purposes of permitting and environmental review.

Sediment samples collected at this site show the median grain size (D_{50}) for the composite sand sample is 0.192 mm with 4% fines. The offshore region from –24 to –30 feet contained the largest percentage of fines ranging from 13 to 17%. Since this site is located immediately adjacent to the Ventura River mouth, beach fill with up to 35% fines is proposed for this site. Also, this site has a wide cobble berm that exists naturally, therefore cobble-sized material is desirable for placement at this location. This project could serve to periodically repair the cobble fill placed by the City in 2000.

3.4.2 Design Scenarios

The beach fill material will be placed below the mean high tide line (if sand) or as a layer over the beach surface as a berm (if cobble) as described in Section 3.1.2 and shown in Figure 3-12. A typical berm at the Surfer's Point site would be elevated to near +10 feet above mean lower low water (MLLW) and extend 100 feet seaward, then slope at 15:1 (H:V) to the water. If a high percentage of cobble is used to build the berm, the beach would be built with a steeper slope (i.e., up to 10:1 (H:V)). The City indicates a steeper slope of 5:1 did not perform well for cobble placement completed in 2000 (Parsons, personal communication 2001)

3.4.3 Timing and Placement Rate

Placement at Surfer's Point is also proposed for Fall-Winter and Spring-Summer placement. Similarly to the Oil Piers site, it is proposed that two-thirds of the sand can be placed during the winter months and one-third during the summer. This allows for the sand to be introduced to the littoral cell similarly to the natural cycles of the Ventura River. At this site, the rate of sand placement for the 175,000 cy per year maximum annual limit is 116,700 cy during the winter and 58,300 cy during the summer as outlined in Table 3.1.

3.5 OXNARD SHORES

The Oxnard Shores beach fill site is located in the City of Oxnard, in Ventura County at the end of West Fifth Street (Figure 3-13). The beach fill site is a public beach with access at West Fifth Street and other points to south. Recreational activities include surfing, swimming, walking, fishing, and boating. Oxnard Shores is bordered by the Pacific Ocean to the west, residential homes to the south and east, and McGrath State Beach to the north.

3.5.1 Proposed Quantity and Quality of Beach Fill Material

The plan view of the Oxnard Shores site is shown in Figure 3-14. The plan shows a beach fill length of approximately 5,600 feet beginning just south of McGrath State Beach and extending south. The maximum annual volume of material proposed for this site is approximately 250,000 cy.

Sediment samples collected at this site show the median grain size (D_{50}) for the composite sample is 0.21 mm, with a fines content of 6.3%. Higher fines content is found from the –24 to -30-foot contours, which ranges from 14 to 37%. Due to the proximity of the Santa Clara River, which is a main sediment source to the littoral cell and conveyor of vast quantities of fines, beach fill with up to 35% fines is proposed for this site.

3.5.2 Design Scenarios

The beach fill material will be placed below the mean high tide line, as a layer over the beach surface as a berm, or as a sand dike along the back of the beach as described in Section 3.1.2. The beach berm is shown in Figure 3-15. The berm would be at approximately +12 feet MLLW and extending up to 65 feet from the back of the beach toward the ocean, then sloping gradually into the water at a 15:1 slope. Any sand dike concept would likely be limited to areas of public property to eliminate the need for approvals from private property owners.

3.5.3 Timing and Placement Rate

Placement at Oxnard Shores is proposed for Fall-Winter placement only (i.e., between September 15 and March 15) because of it's proximity to least tern and snowy plover nesting areas (See Appendix B). Least terns and snowy plovers nest, breed, and forage during the spring-summer months (April 15 to September 15). Discharge into the ocean may cause increased turbidity and may effect foraging. Also, construction activities may disturb nesting. Therefore, it is proposed to avoid the nesting season and place sand during the Fall-Winter months when the effects of beach fill construction will not have an impact on the least terns and snowy plovers.

3.6 HUENEME BEACH

Hueneme Beach fill site is located in the City of Port Hueneme, in Ventura County (Figure 3-16). The beach fill site is located just east of the entrance to Port Hueneme, which is a U.S. Naval Port. The Hueneme Beach site is surrounded by the Pacific Ocean to the south, residential homes to the north, and the Port Hueneme fishing pier to the east. Recreational activities include surfing, swimming, sunbathing, fishing, and boating.

3.6.1 Proposed Quantity and Quality of Beach Fill Material

The plan view of the Hueneme Beach fill is shown in Figure 3-17. The plan shows a beach fill length of approximately 4,400 feet beginning just east of Port Hueneme and extending east. The annual volume of material proposed for this site is approximately 250,000 cy.

Sediment samples collected at this site show the median grain size (D_{50}) for the composite sample is 0.168 mm with 10% fines. The fines content varied along the profile with the higher percentages in the offshore region from –18 to –30 feet MLLW (17 to 53% fines). Therefore, beach fill with up to 35% fines is proposed for this site.

3.6.2 Design Scenarios

The beach fill material will be placed below the mean high tide line or as a layer over the beach surface as a berm as described in Section 3.1.2 and shown in Figure 3-18. The berm would be a level surface at approximately +10 feet MLLW, extending 150 feet from the back of the beach toward the ocean, then sloping gradually into the water at a 15:1 slope.

3.6.3 Timing and Placement Rate

Placement at Hueneme Beach is proposed for Fall-Winter placement only (i.e., between September 15 and March 15) because of it's proximity to least tern and snowy plover nesting areas (See Appendix B). For the same reasons as outlined for Oxnard Shores beach fill site, Spring-Summer placement at a location adjacent to nesting areas it is not recommended. Therefore, it is proposed to avoid potential impacts to least terns and snowy plovers and place sand during the Fall-Winter months when beach fill construction will not have an impact.

3.7 NATURAL BEACH PROFILE ADJUSTMENT AND SCARPING

For each design concept, the post-construction beach fill profile will be steeper than the pre-construction beach profile, but will naturally evolve toward an equilibrium average nearshore slope which is a function of sediment and wave characteristics. While the concept designs in this report specify that construction profiles are approximately 15:1 or 10:1, the beach fill will naturally disperse over a wider portion of the beach and nearshore zone resulting in a flatter profile. Flattening of the slope and profile adjustment causes reduction of the berm width from the post-construction profile. Figure 3-19 illustrates this concept. Although sand may move away from the profile by waves and currents, the concept design profiles shown in this report represent the maximum envelope of sand placement across the beach for purposes of permitting.

The level of protection afforded by the additional beach area after natural profile adjustment may remain approximately the same as that provided immediately after beach fill construction. This occurs because water depths will decrease in the nearshore zone causing waves to break farther from shore, reducing wave runup elevations at the beach from pre-project conditions.

Periodic re-grading of the post-construction beach fill may be required to minimize scarping. Bulldozers can be used to reduce a vertical scarp, which may form as waves rework the seaward edge of the beach fill slope.

Table 3.1. Proposed Annual Limitations of Sand Placement Quantities.

PLACEMENT SITE	PERCENT FINES ALLOWED(1)	MAXIMUM QUANTITIES (CY) PER SEASON		MAXIMUM ANNUAL TOTAL QUANTITY
		Fall/ Winter	Spring/ Summer	
Goleta Beach	25%	100,000	0	100,000
Ash Avenue	25%	100,000	0	100,000
Oil Piers	35%	183,300	91,700	275,000
Surfer's Point	35%	116,700	58,300	175,000
Oxnard Shores	35%	250,000	0	250,000
Hueneme Beach	35%	250,000	0	250,000

(1) A 25% fines limit is proposed at Goleta Beach and at Ash Avenue because of existing sensitive resources located near the project sites. At all other sites 35% fines is proposed, since limited offshore resources exist at these sites and a high percentage of fines exist.

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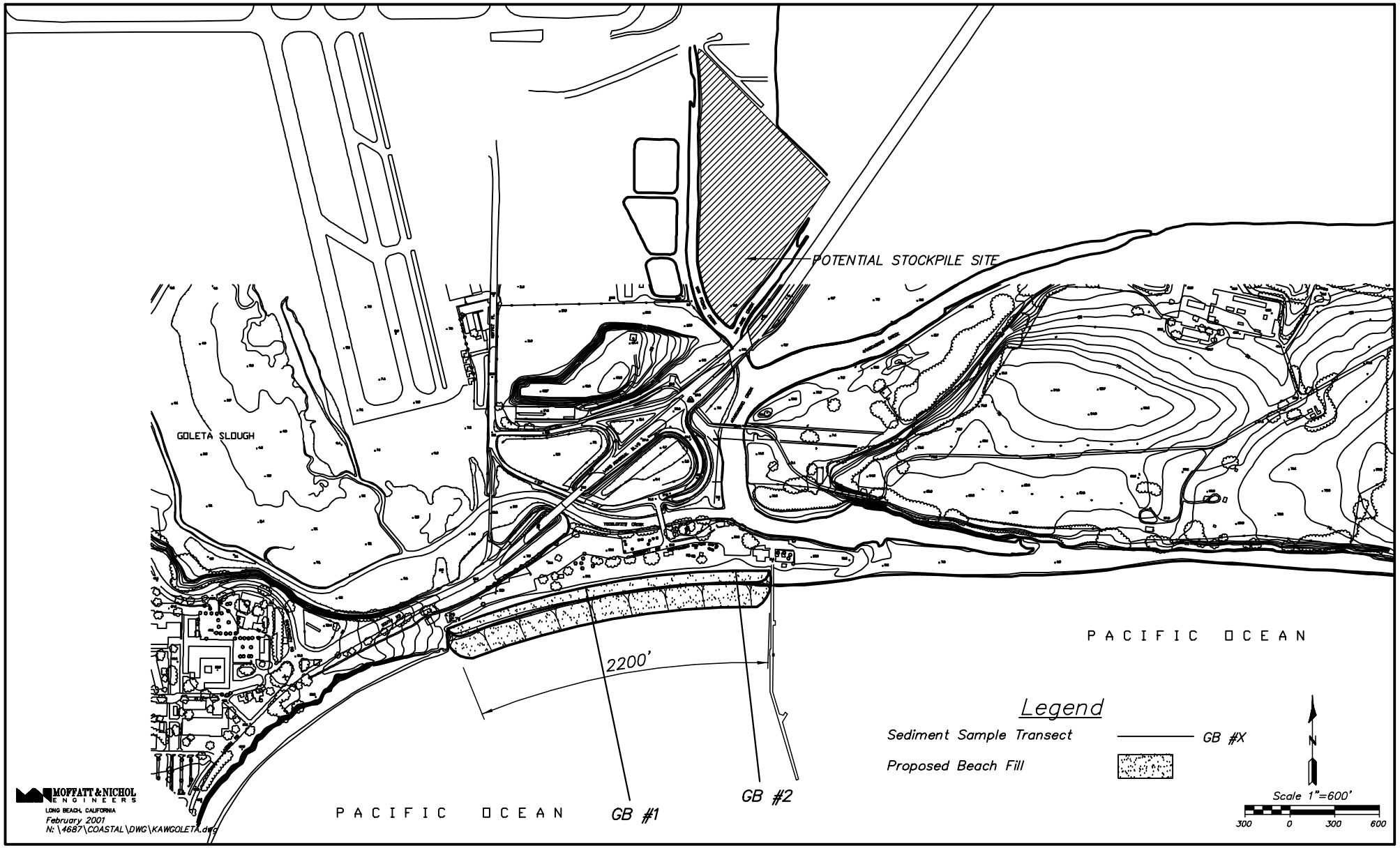
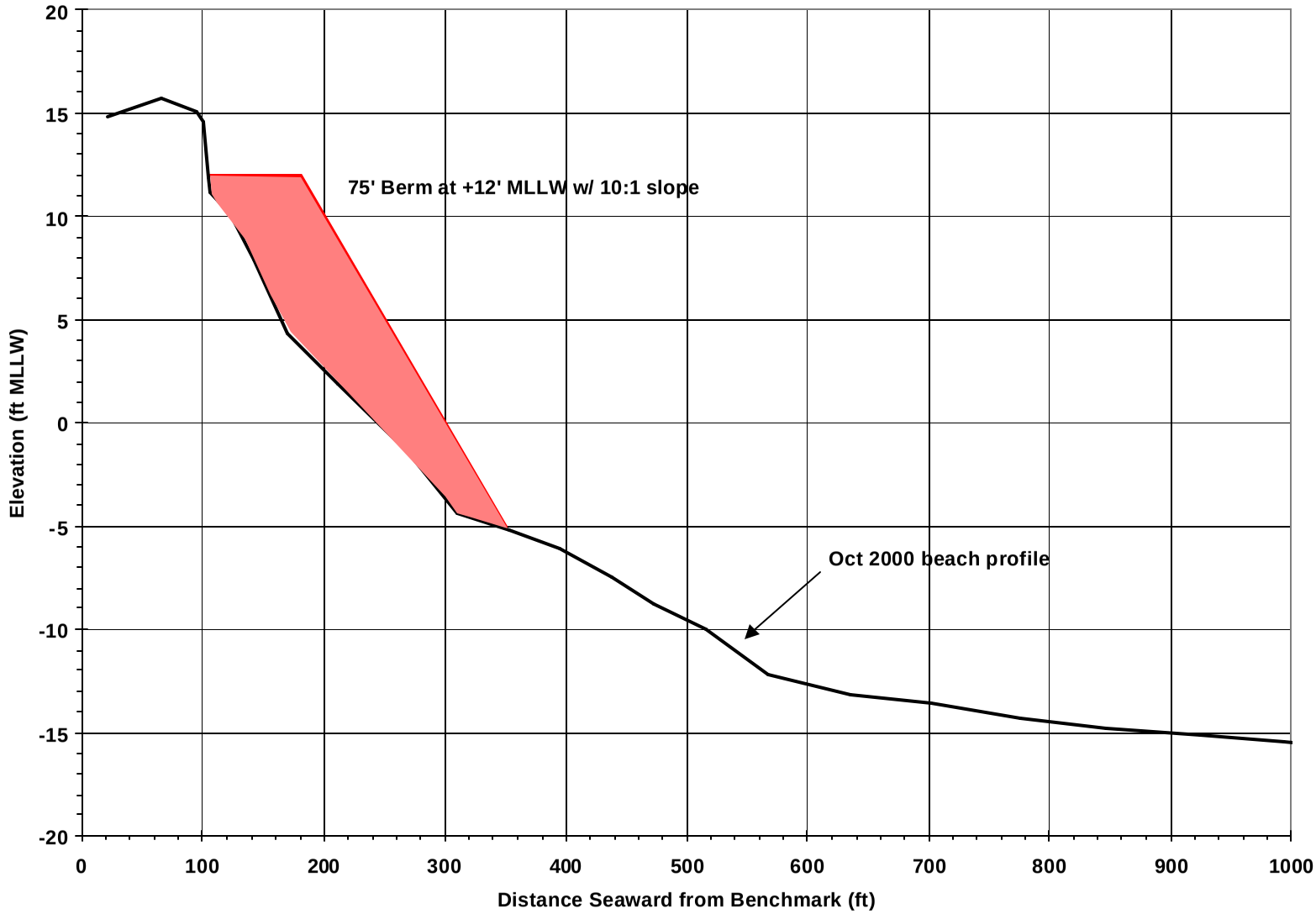
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Goleta Beach Aerial Photograph	Figure 3-1



SOUTH CENTRAL COAST
BEACH ENHANCEMENT PROGRAM

GOLETA BEACH – BEACH FILL PLAN

Figure
3-2



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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Goleta Beach Typical Section Of Beach Berm Design	Figure 3-3

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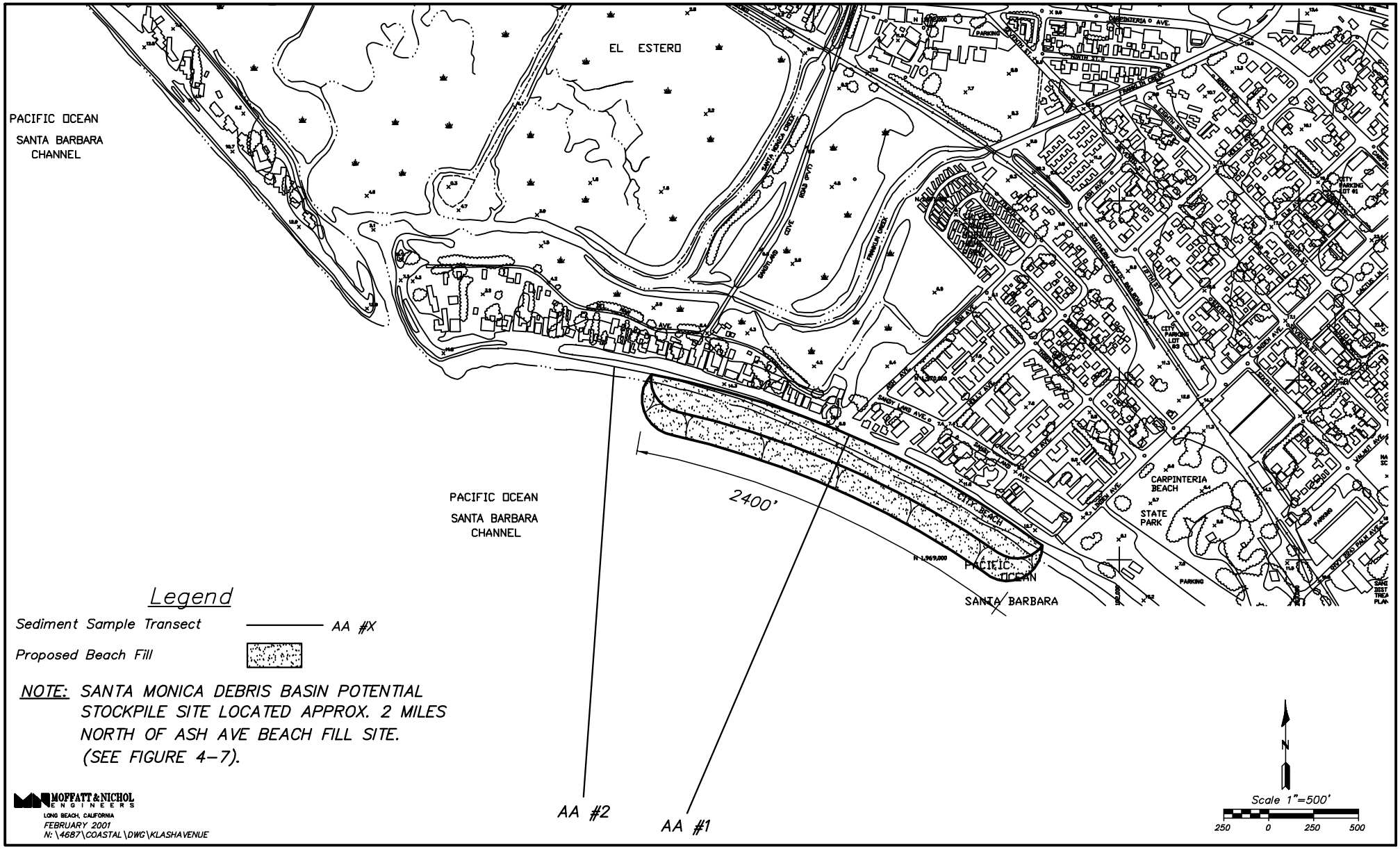
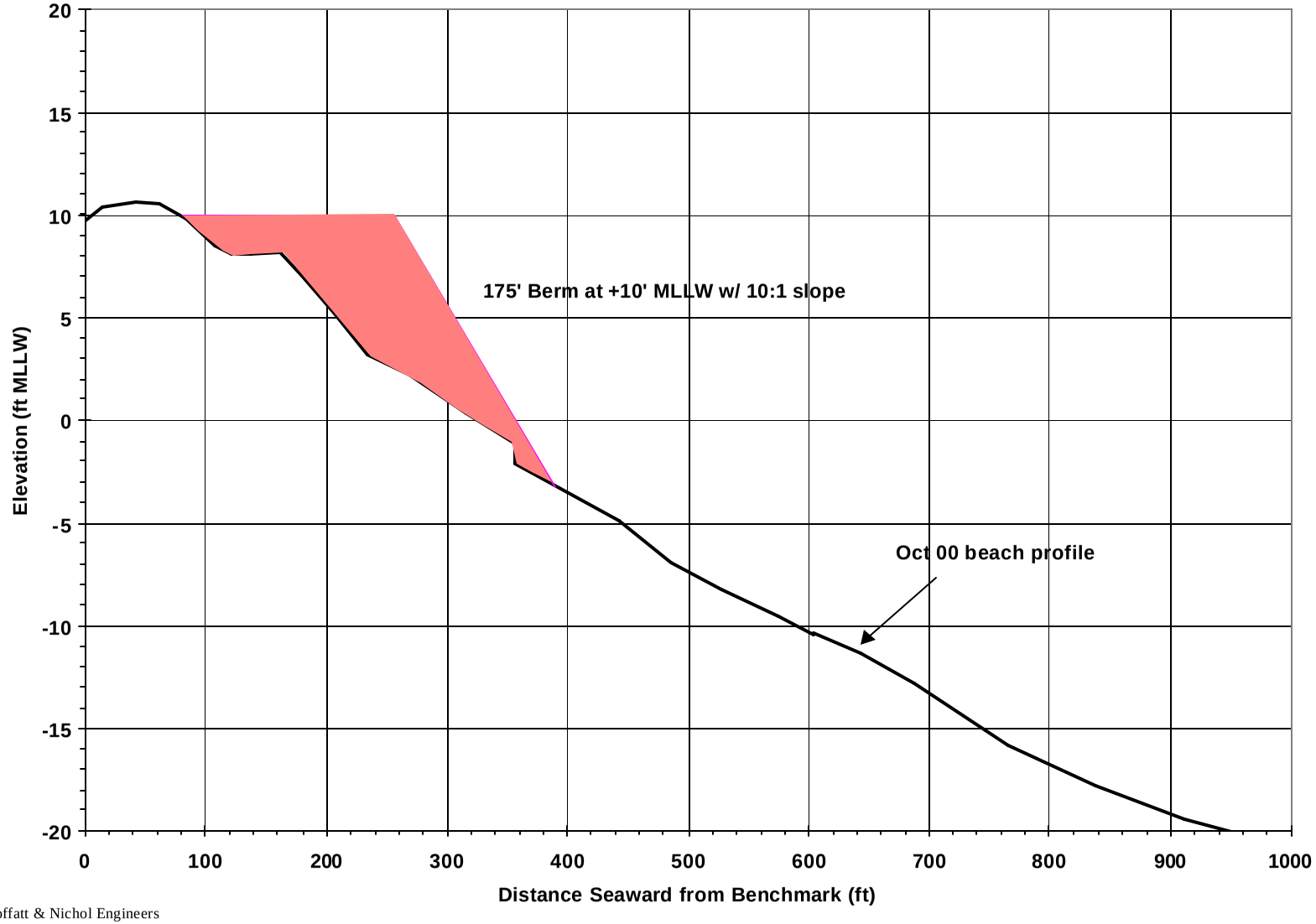
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Ash Avenue Aerial Photograph	Figure 3-4



SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	ASH AVENUE – BEACH FILL PLAN	Figure 3-5



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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Ash Avenue Typical Section Of Beach Berm Design	Figure 3-6

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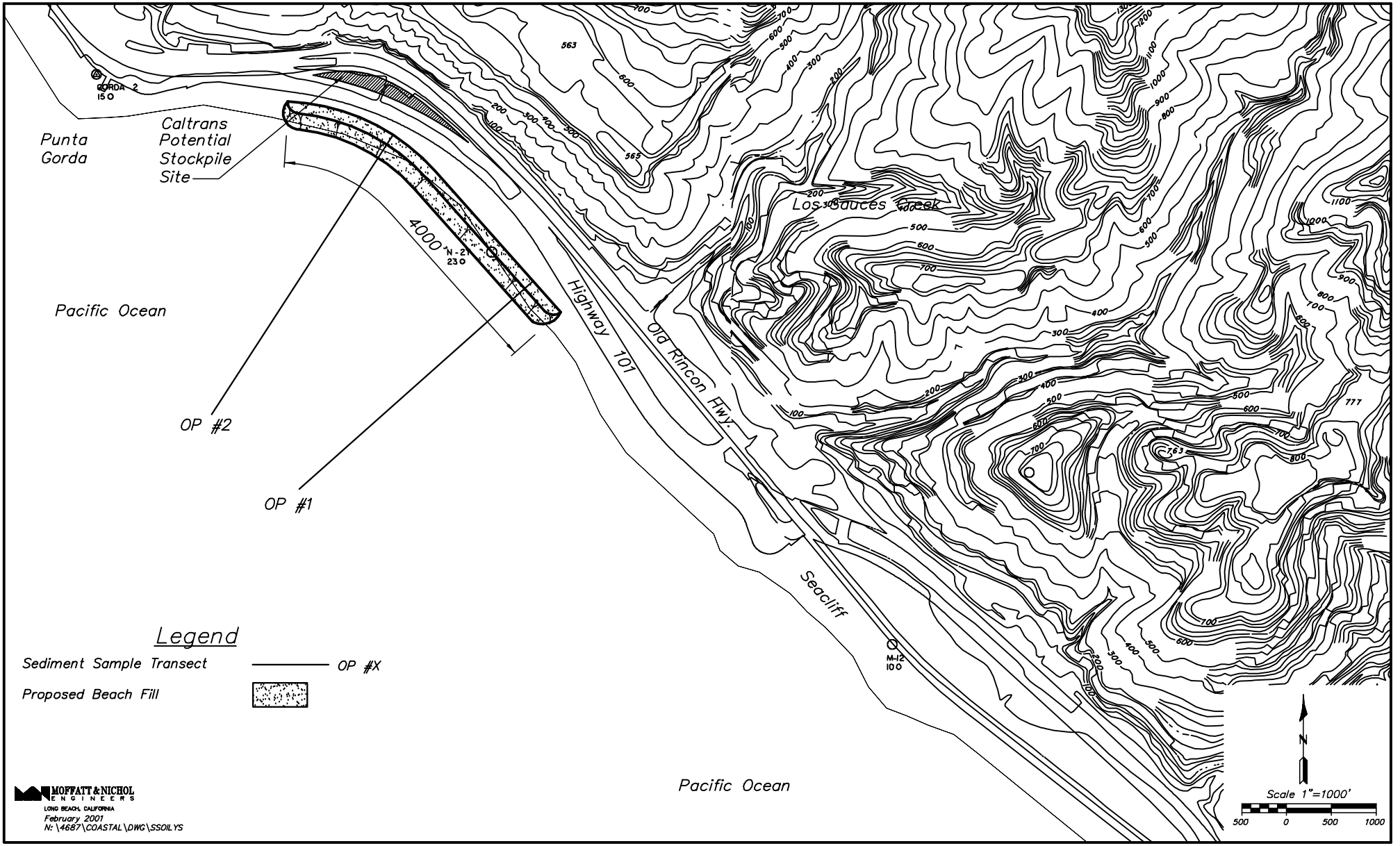
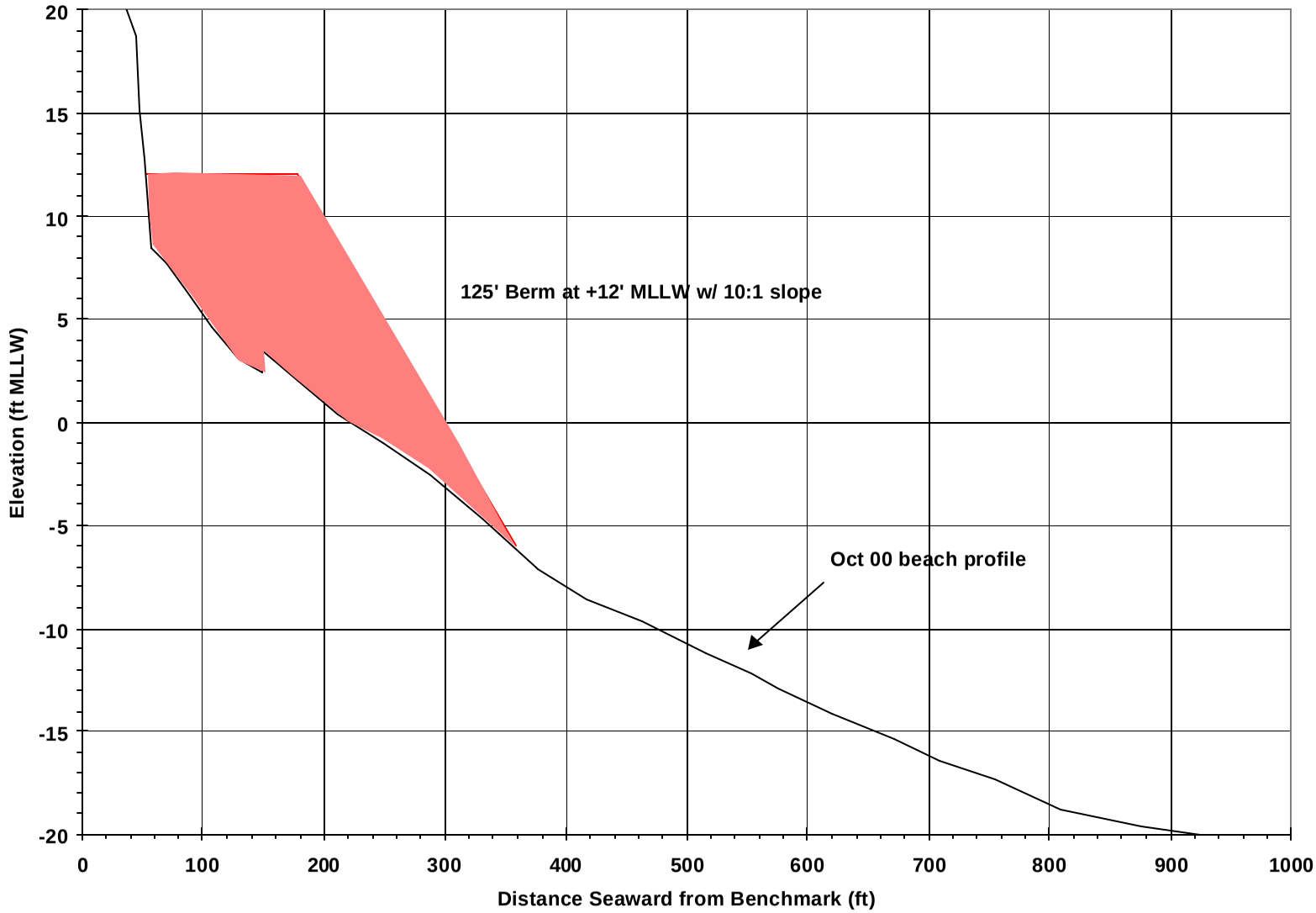
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Oil Piers Aerial Photograph	Figure 3-7



SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	OIL PIERS – BEACH FILL PLAN	Figure 3–8



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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Oil Piers Typical Section Of Beach Berm Design	Figure 3-9

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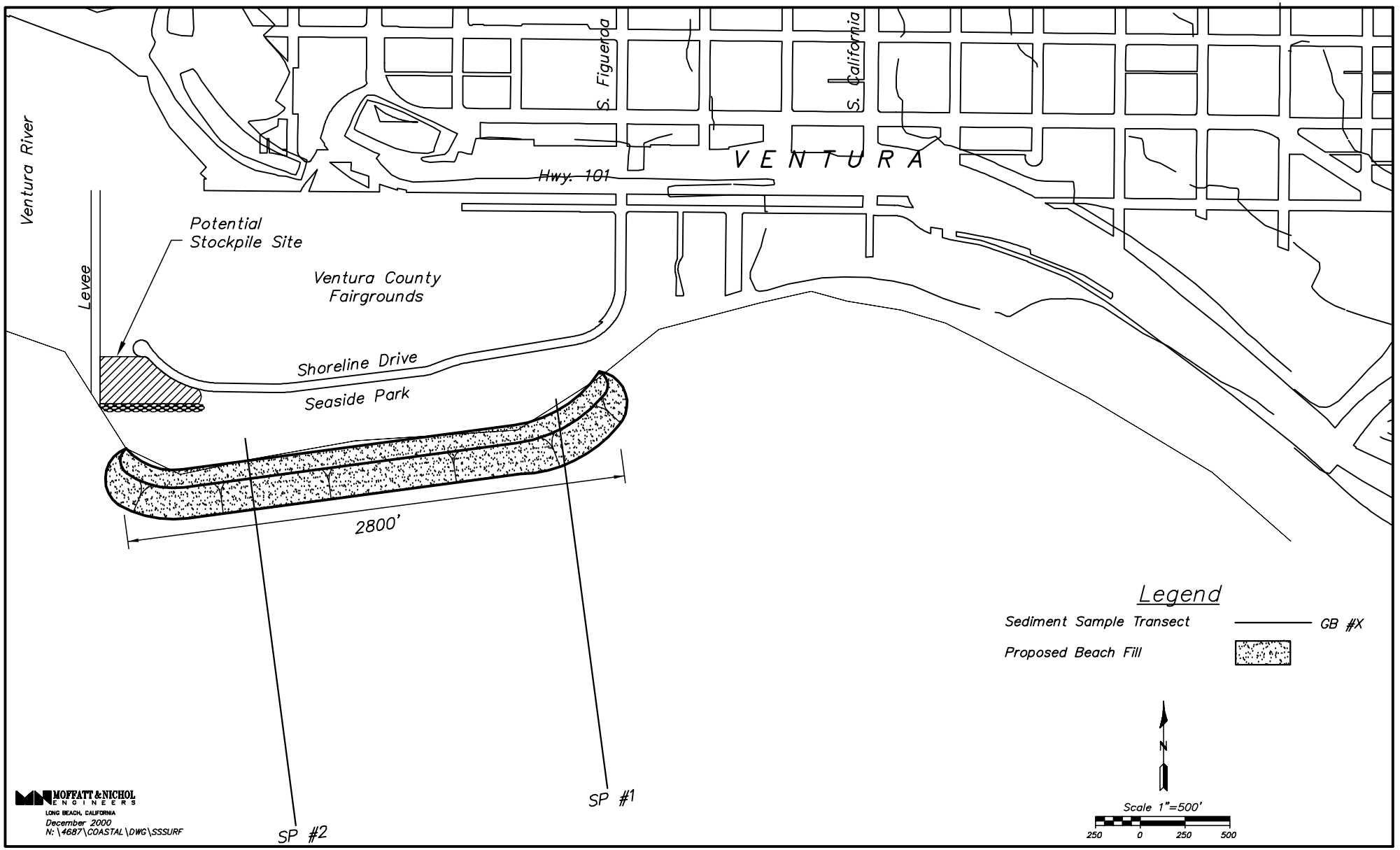
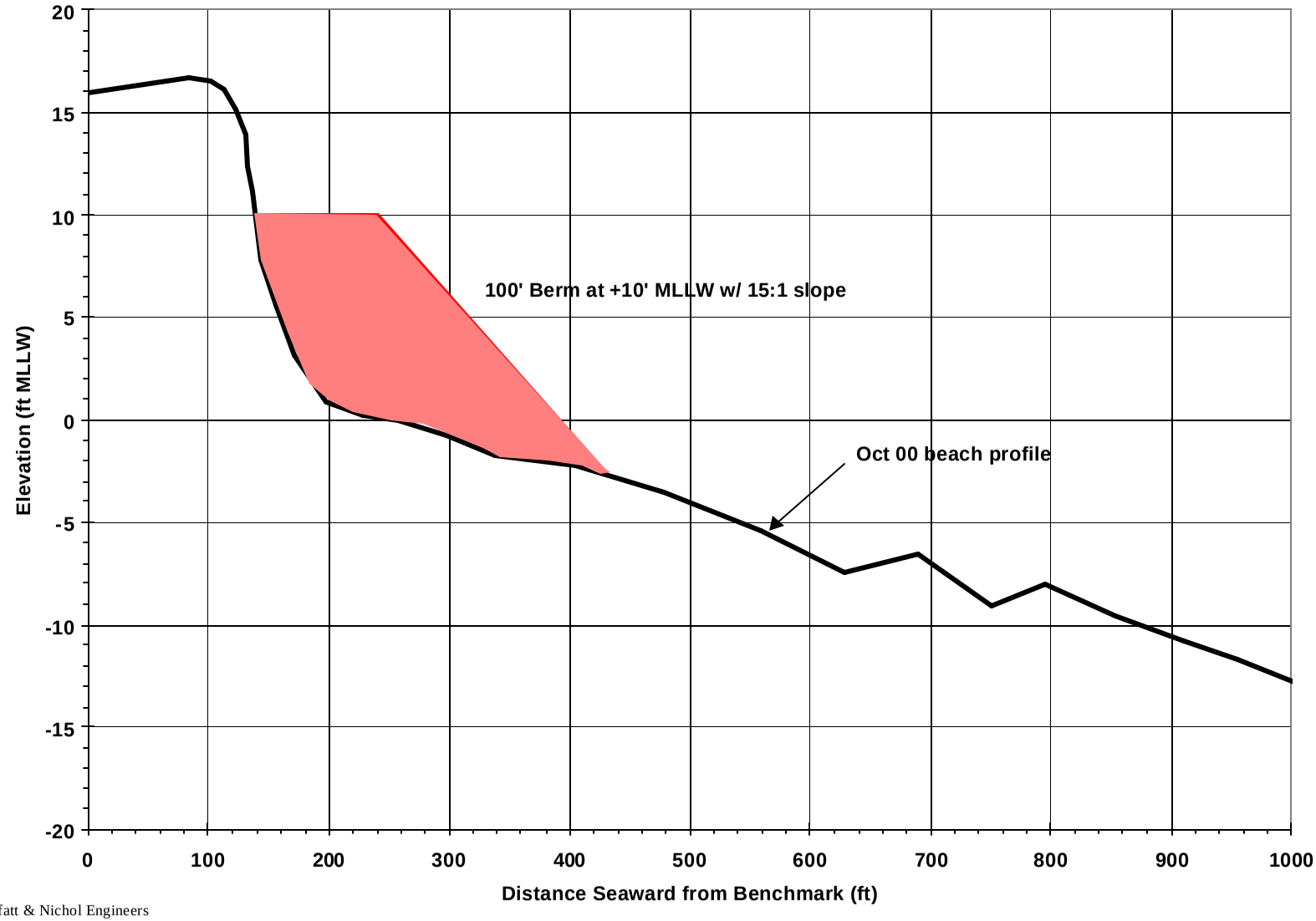
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Surfer's Point Aerial Photograph	Figure 3-10



SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	SURFER'S POINT – BEACH FILL PLAN	Figure 3–11



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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Surfer's Point Typical Section Of Beach Berm Design	Figure 3-12

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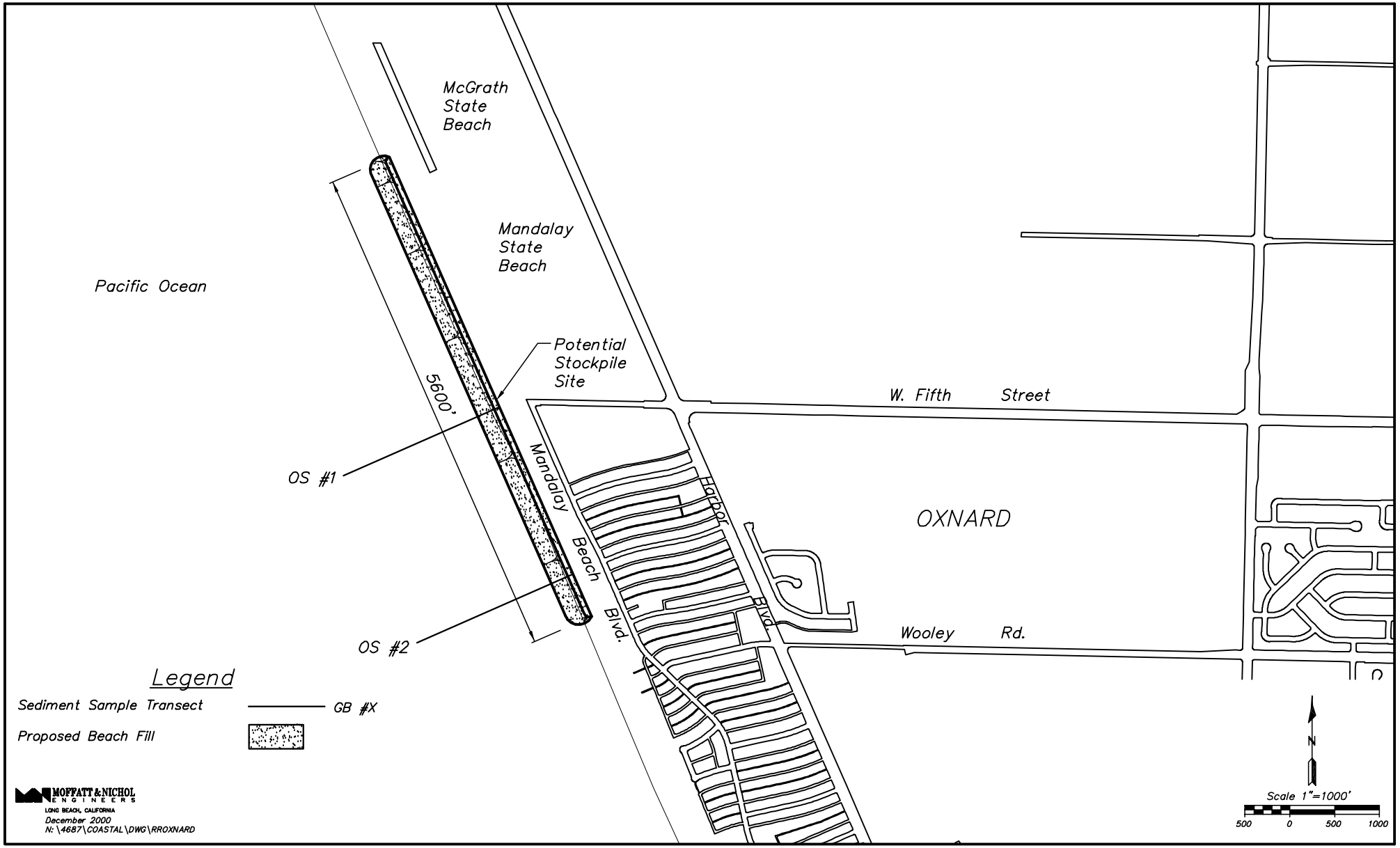
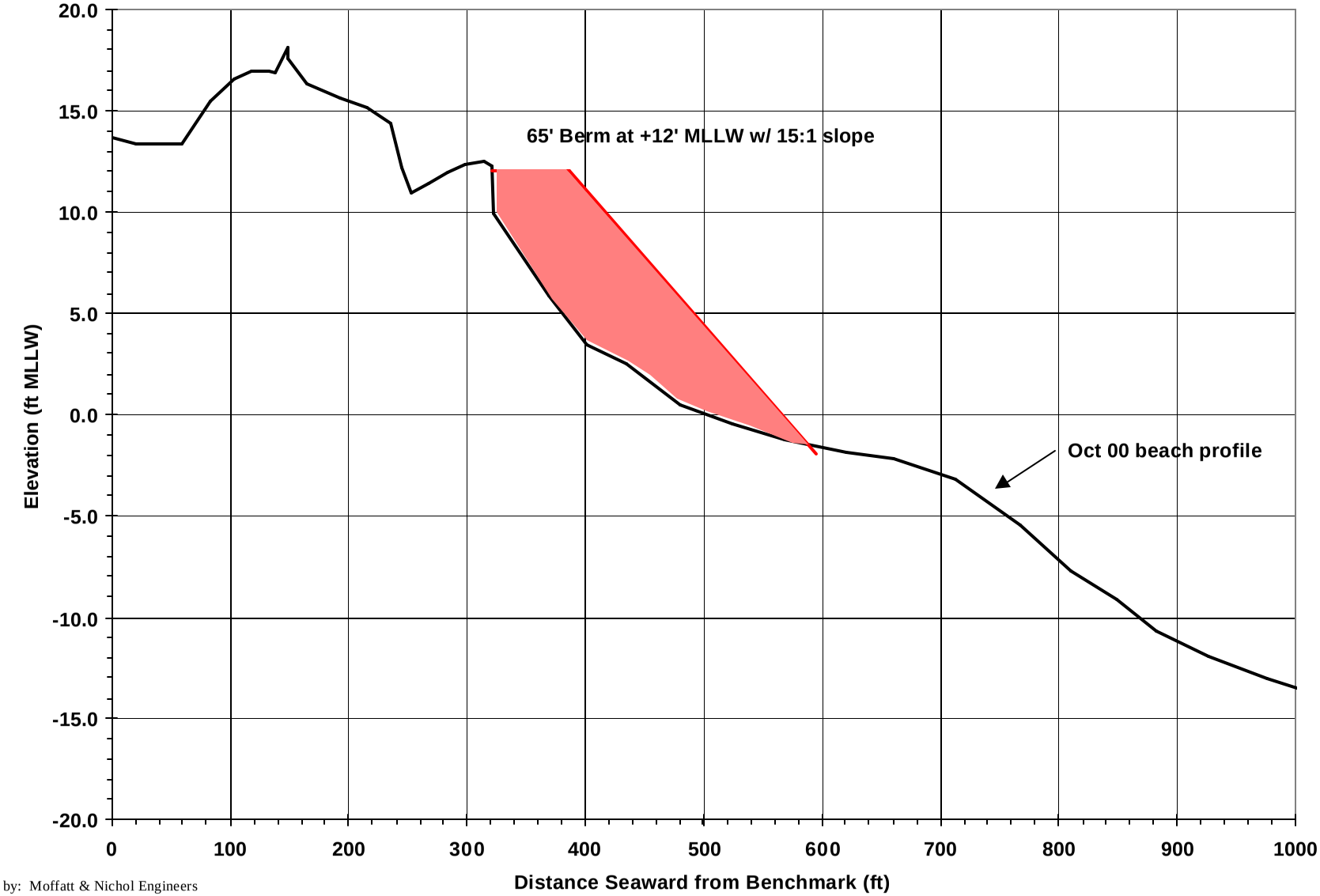
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Oxnard Shores Aerial Photograph	Figure 3-13



SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	OXNARD SHORES – BEACH FILL PLAN	Figure 3–14



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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Oxnard Shores Typical Section Of Beach Berm Design	Figure 3-15

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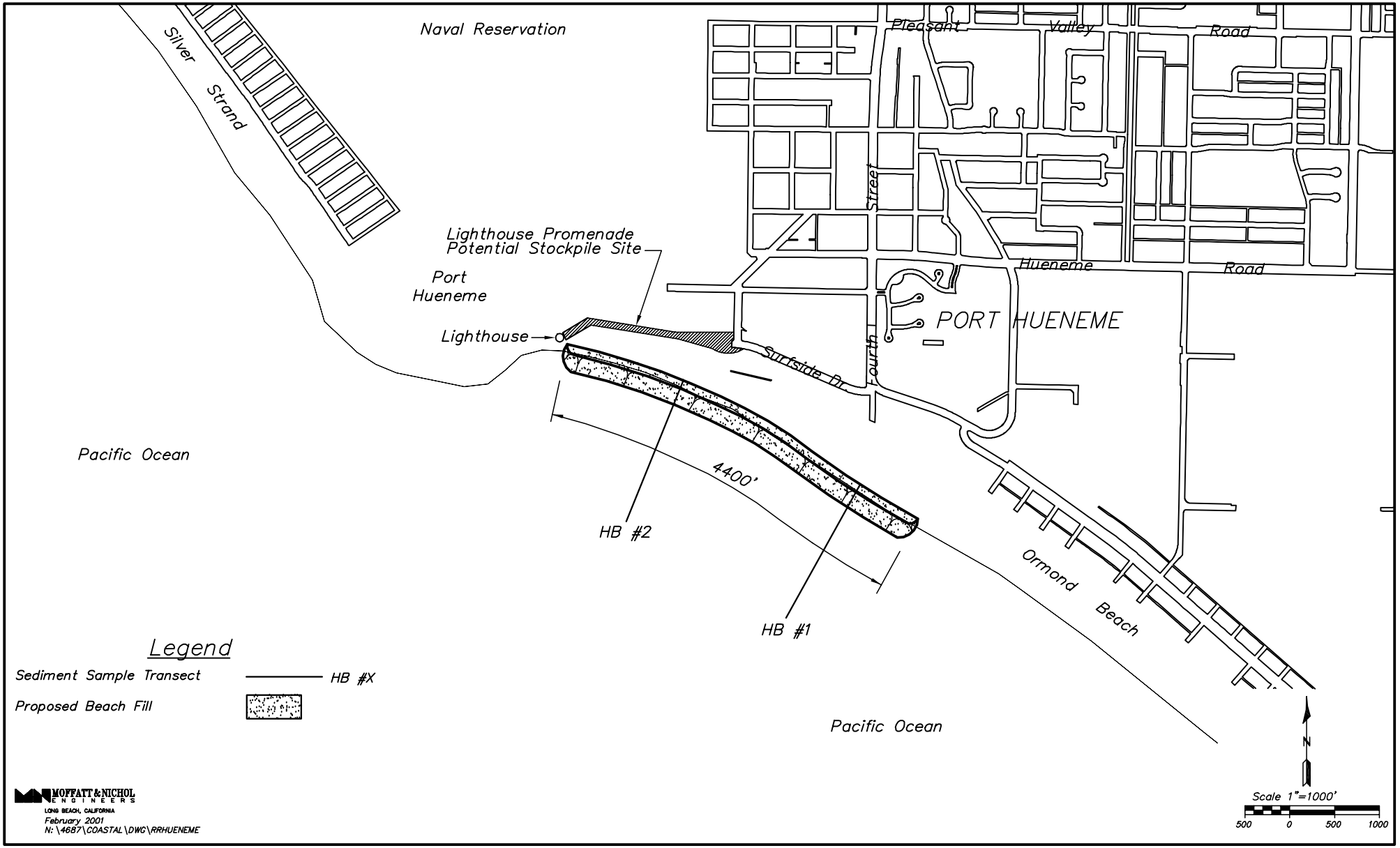
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Hueneme Beach Aerial Photograph	Figure 3-16



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LONG BEACH, CALIFORNIA
February 2001
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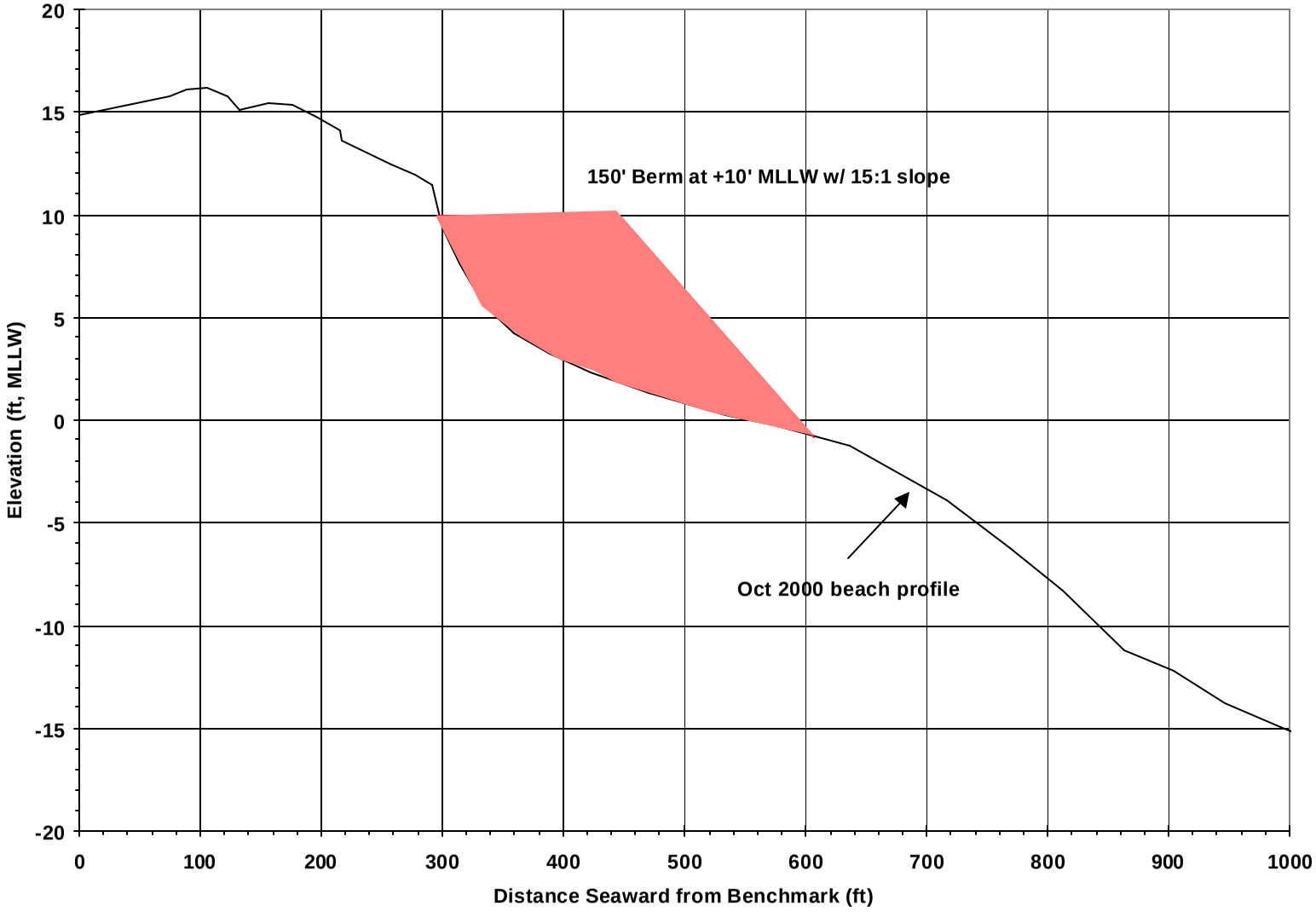
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	HUENEME BEACH – BEACH FILL PLAN	Figure 3–17



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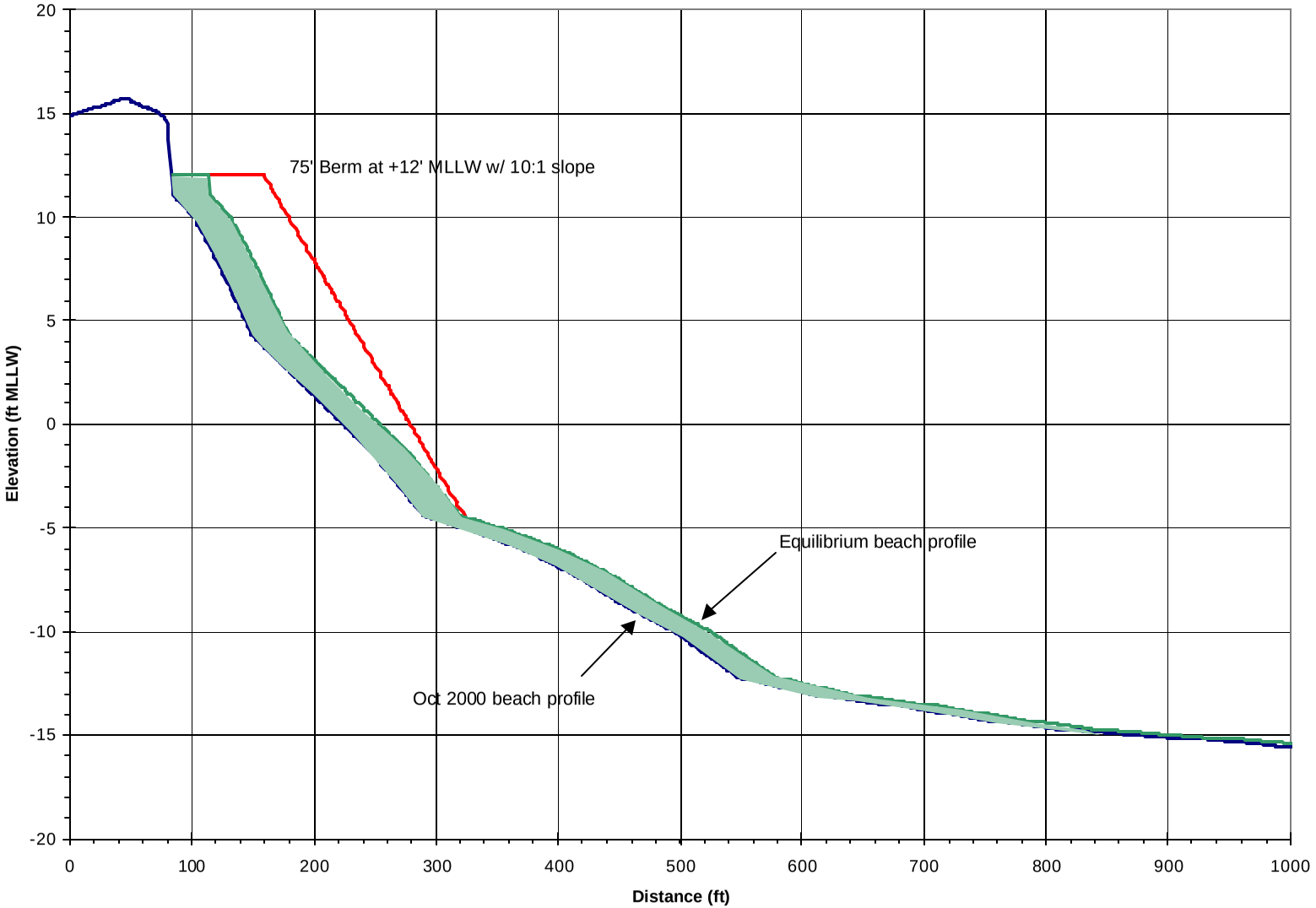
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Hueneme Beach Typical Section Of Beach Berm Design	Figure 3-18



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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Example of an equilibrium profile at Goleta Beach	Figure 3-19

4.0 SAND SOURCES

Potential sand sources have been identified as part of the program, including flood control debris basins, river and slough sediments, landslide material, decommissioned dams, and material from miscellaneous construction activities. This section identifies and attempts to quantify these sources. Note that only first order estimates are possible at this time due to limited data available.

Debris basins and other sources of sediment (Goleta Slough, Calleguas creek, etc.) provide a tremendous amount of sediment every 5 to 10 years (e.g., 1969, 1978, 1983, 1995, and 1998). The debris basins and estuaries in Santa Barbara County alone could supply approximately 500,000 cy in heavy rainfall years as was demonstrated in 1995. This means that approximately 2,000,000 cy of sediment could have been placed on Santa Barbara beaches over the past 25 years for an average annual contribution of 80,000 cy. The annual average contribution to the Santa Barbara Littoral Cell from the Santa Ynez Mountain group is approximately 180,000 cy, so placement of sediment from debris basins and other drainage courses subject to sedimentation onto Santa Barbara's beaches would be a significant benefit. (BEACON 2000)

4.1 SOURCE LOCATIONS AND VOLUMES

A list of potential sources and possible volumes was created for each beach fill site and is shown in Table 4.1. The proximity of these sources to the proposed beach fill sites are shown in Figure 4-1 for Santa Barbara County and Figure 4-2 for Ventura County. The debris basin volumes were estimated using the total debris capacity of all basins in each county, then multiplying by 20%, which represents the percent of beach quality material estimated to be contained within the basins (Karl Treiberg, County of Santa Barbara, personal communication, December 2000). The Goleta Slough and Carpinteria Marsh volumes were estimated using historical dredge volumes (Karl Treiberg, County of Santa Barbara, personal communication, December 2000). It is important to note that these are only estimates and the volumes change because of weather conditions; debris basins can reach capacity more that once in a season, or not reach capacity for many years. The potential volume of landslide material was estimated by Wayne Johnson, Maintenance Area Manager of Caltrans District 7 for Ventura County (personal communication, December 2000), and Ken Nirenberg, Maintenance Area Manager Caltrans District 5 for Santa Barbara County (personal communication, December 2000), and indicates an average yearly volume. Production of landslide material is also heavily dependent on the weather, since wet weather causes more landslides to occur and therefore more beach quality sand may become available.

Table 4.1. Potential Sand Sources And Estimated Volumes

Receiver Site	Potential Sand Sources	Transport Method	Volume (cubic yards)	Foot-note
Goleta Beach	Flood Control Debris Basins	Truck	125,000	1
	Goleta Slough	Dredge	25,000-200,000	2
	Caltrans landslide material	Truck	10,000 – 100,000	3
	Miscellaneous upland construction	Truck	unknown	
Ash Avenue	Flood Control Debris Basins	Truck	125,000	1
	Carpinteria Marsh	Dredge/Truck/Conveyor	10,000 – 40,000	2
	Caltrans landslide material	Truck/Rail	10,000 – 100,000	3
	Miscellaneous upland construction	Truck	unknown	
Oil Piers	Flood Control Debris Basins	Truck/Conveyor	225,000	1
	Caltrans landslide material	Truck/Conveyor	200,00-250,000	3
	Miscellaneous upland construction	Truck/Conveyor/Rail	unknown	
Surfer's Point	Flood Control Debris Basins	Truck	225,000	1
	Matilija Dam Decommissioning	Truck	Up to 6,000,000	4
	Ventura River	Truck	unknown	
	Miscellaneous upland construction	Truck	unknown	
Oxnard Shores	Flood Control Debris Basins	Truck	225,000	1
	Santa Clara River	Truck/Conveyor	unknown	
	Callegus Creek	Truck	300,000	5
	Miscellaneous upland construction	Truck	unknown	
Hueneme Beach	Flood Control Debris Basins	Truck	225,000	1
	Port Construction Activities	Truck/Conveyor	unknown	
	Mugu Lagoon	Truck	unknown	
	Ormond Slough	Dredge/Truck	unknown	
	Callegus Creek	Truck	300,000	5
	Caltrans landslide material	Truck/Rail	200,000-250,000	3
	Miscellaneous upland construction	Truck	unknown	

1. Debris basin capacity in each respective county, multiplied by 20% (the percent of material, believed to be of beach quality).
2. Historic dredge volume, project every three to four years.
3. Average yearly volume.
4. Estimated total volume (one-time volume).
5. Average volume removed from Callegus creek every four to five years.

4.1.1 Flood Control Debris Basins

There are currently over 16 flood control debris basins in Santa Barbara County and over 30 in Ventura County (Ventura County 1999). Figure 4-3 and Figure 4-4 show the locations of the basins as presented by the Santa Barbara County Flood Control District and the Ventura County Flood Control District, respectively. As shown in Figure 4-3, the debris basins in Santa Barbara County are generally located within five to ten miles of the coastline. In Ventura County (Figure 4-4), the basins are generally located within 10 to 20 miles of the coastline. The increased distance to the debris basin in Ventura County is caused by the regional geology, where the mountains and respective watersheds are located further inland.

The debris basins act to trap sediment and debris (Figure 4-5) that may otherwise travel downstream and cause flood control problems. The flood control districts periodically clean out the debris basins, with heavy earthmoving equipment. Normally, the material removed from the basins is used for landfills or sold to contractors. The purpose of this program is to place the beach-compatible material on one of the six beach fill sites instead of the usual upland disposal locations. Delivery of debris basin sediment involves removal of incompatible material such as brush and boulders at the site. Removal of this material may be accomplished through mechanical sifting and reworking of the sediment using conventional earthmoving equipment (Chambers 1992) (See Section 4.2.5). The beach compatible material could then be hauled to the beach via trucks.

As mentioned, debris basin infilling is sporadic and depends on the precipitation that occurs during any given year. Heavy infilling events tend to occur about every five years (Bailard 1990). However, basin cleanout does occur more frequently.

4.1.2 Rivers, Creeks, Sloughs, and Marshes

Another potential source of sandy material comes from rivers, creeks, sloughs, and marshes. The Ventura River and the Santa Clara River have historically provided large quantities of sediment to the littoral cell. However, the sediment supply has slowed since construction of dams upstream. Portions of the Ventura and Santa Clara Rivers are periodically excavated as flood control measures. Sediments produced by this excavation could be placed on the beach to help offset the volume of sediment that is trapped upstream behind dams and other flood control devices. Due to a limited amount of available information, specific volumes were not estimated for this type of excavation event. In addition, the Santa Clara River Enhancement and Management Plan (Ventura County 1999) lists recommendations for each reach of the Santa Clara River and identifies potential mining areas as shown in Figure 4-6.

The Goleta Slough, which is under the administration of the Santa Barbara County Flood Control and Water Conservation District and Water Agency (SBCFCD), is a potential source of beach quality material. During the severe winter storms of 1995, 400,000 cy of sediment was deposited in the Slough (200,000 cy on January 10 and 200,000 cy on March 10). However, this large volume is not always available in the Slough. For instance, the SBCFCD is currently dredging 25,000 cy from the slough. For general estimating purposes, it is assumed that the Goleta Slough and its tributaries may yield an estimated volume of between 25,000 to 200,000 cy of sediment.

The channels within the Carpinteria Marsh have been maintained for flood control purposes by the SBCFCD. Sediment contained within the channels is considered a potential source of beach fill material. As with the Goleta Slough, the sediment is removed via dredge every three to four years. However, the volume is less than that of the Goleta Slough and is estimated to be approximately 10,000 to 40,000 cy. Only a small fraction of this may be beach compatible (6,500 cy) according to SBCFCD (Karl Treiberg, County of Santa Barbara, personal communication, December 2000). In addition to channel maintenance, the SBCFCD is investigating Carpinteria Marsh inlet improvements where up to 14,000 cubic yards may become available for beach fill.

Callegus Creek in Ventura County yields of large quantity of sediment. Historical records indicated that in the Lower Callegus Creek from Highway 1 to Hueneme Road Bridge approximately 300,000 cy is removed every four to five years.

The Matilija Dam, located on the Ventura River, is presently being studied to look at the feasibility of decommissioning the dam. It is estimated that there is six million cubic yards of sediment trapped behind the dam. A Sediment Management Plan is scheduled for completion in 2001 to determine the physical and chemical properties of the sediment (Flynn 2000). It is potentially a very large future source of sediment for BEACON.

4.1.3 Landslides

Landslide deposits are another potential source of sediment for the beach enhancement program. Caltrans Districts 5 and 7 have expressed interest in working with BEACON to place beach quality material generated from landslides on the beach. Landslides generally occur during the winter-wet season. Caltrans is the California state agency responsible for planning, designing, building, operating, and maintaining California's state highway system including rail and mass transit. Therefore, when landslides occur near roadways and railroad tracks, Caltrans is responsible for removing the material and disposing of it properly. It is estimated that in Ventura County, approximately 200,000 to 250,000 cy of sediment is generated annually from such landslides (Wayne Johnson, Ventura County Maintenance Area Manager of Caltrans District 7, personal communication, December 2000). In Santa Barbara County approximately 10,000 to 100,000 cy are produced annually (Nirenberg 2000). No information is available at this time regarding the proportion that is beach compatible.

4.1.4 Other Sources

It is impossible to accurately estimate the volume of material that may be available from one year to the next from unforeseen upland development or other projects. However, additional sources may become available during the five-year program life. These include, sediment generated from upland construction projects, wetland restoration projects, and other unidentified sources. These sources should be included in the program due to the possibility of their existence.

4.2 CRITERIA OF BEACH FILL SAND SOURCES

Criteria for beach fill sand sources are specified to enable BEACON to implement projects in accordance with environmental guidelines established by the State and Federal government, as

discussed in Section 2.0 of this report. These criteria include chemical testing, sediment grain size, color, particle shape, debris, and compactability/moldability. Each source of potential beach sediment will be analyzed against each of these criteria to determine if the sediment is beach compatible and which site should receive it. This section describes each of these criteria.

4.2.1 Chemical Testing

BEACON and resource agencies have specified that material with a chemical content incompatible with beach fill is not desired. BEACON proposes to conduct chemical testing for each potential sand source if an initial investigation warrants testing. However, depending on the sand source, the types and amount of chemical testing may change. Some sand sources may have more potential of containing contaminants than others, in which case more testing would occur.

Regarding chemical compatibility, sediment samples shall be stored per USEPA guidelines. Samples shall be taken from five (5) different sites, at both the source and disposal sites. The volume of sediment samples shall be sufficient to test grain size compatibility and chemistry suitability per the Inland Testing Manual (ITM) (USEPA and USACE 1998). Chemical suitability shall comply with the criteria outlined in the ITM. Chemical testing may encompass metals, organic compounds (PCB's, pesticides, and polycyclic aromatic hydrocarbons), total organic carbon (TOC), and possibly certain bacteria. At a minimum, the basic suite of bulk chemistry testing will be done as a screening mechanism for more detailed tests. Bulk chemistry testing is specified in the ITM.

Regulatory agencies are often more concerned with fine-grained sediments than coarser sediments for a number of reasons. First, many contaminants have a greater affinity for clay and silt than for sand (USEPA and USACE 1998, p.8-6). Second, fines can settle out in calmer waters offshore, burying reef habitat. Third, fines can remain in suspension for a certain period creating turbidity that obscures feeding grounds for sensitive birds.

Chemical testing may not be necessary or as complex if a site evaluation indicates the material is not a "carrier of contaminants." The ITM (p. 4-1) notes the following list of conditions that will tend to preclude contamination:

1. Material is primarily sand, gravel, and/or inert material;
2. Sediments are from locations far removed from sources of contaminants (based on agency judgement);
3. Sediments were deposited in pre-industrial times; and
4. Sediments were not exposed to modern sources of pollution.

Additionally, examples of potential contemporary sources of pollution are also presented in the ITM (p. 4-3) as follows:

1. Urban and agricultural runoff;
2. Sewer overflows/bypassing;
3. Industrial and municipal wastewater discharges;

4. Previous dredged or fill discharges;
5. Landfill leachate/groundwater discharges;
6. Spills of oil or chemicals;
7. Releases from Superfund and other hazardous waste sites;
8. Illegal discharges;
9. Air deposition;
10. Biological production (detritus); and
11. Mineral deposits.

Finally, conditions that could potentially cause contamination of the material prior to its excavation are listed in the ITM (p. 4-4) as:

1. Bathymetry;
2. Water current patterns;
3. Tributary flows;
4. Watershed hydrology and land uses;
5. Sediment and soil types; and
6. Sediment deposition rates.

The USACE and the USEPA will likely require a confirmation process with the above-listed items as a checklist to be reasonably certain that potential beach fill is chemically compatible with receiving beaches. In the event that BEACON requires chemical testing of beach fill material, a sampling/testing plan will be developed for that specific source consistent with USACE guidelines and approved by the USACE and USEPA prior to the testing. Test results will be interpreted by the resources agencies for a determination of material acceptability.

4.2.2 Sediment Grain Size

The objective of specifying an acceptable range of grain sizes for the beach fill is to define a maximum fines content for the material based on replicating natural sedimentation processes while remaining within agency constraints. The ITM (p. 2-5) notes that the major evaluation effort must be placed on deposited material and its effect on the benthic environment. The ITM (p. 3-6) emphasizes the "reference sediment" concept. Applied to the South Central Coast Beach Enhancement Program, the reference sediment approach could be interpreted as follows:

1. The total amount of fine-grained sediment (clays and silts, passing the #200 sieve or less than 0.074 millimeters in diameter) introduced artificially into the littoral zone (portion of fines times total volume of beach fill) should not exceed the quantity of fines at beaches at the point of discharge. However, internal USACE guidelines (Russ Kaiser, USACE, personal communication, 2000) indicates that the fines content may be up to 10% above existing fines at the location of placement. Section 3.0 outlines each beach fill site and

describes the existing sediment grain size conditions at each site. Also, Appendix A contains the results of the sediment grain size analysis for each of the six beach fill sites.

2. The time of year when fines in beach fill are mobilized by waves and suspended in the water column should not differ greatly from when material is introduced to the water column by natural phenomena (i.e., all-winter placement or two-thirds of sand volume placed during the Fall-Winter season, between September 15 and March 15).

Informal USACE guidelines titled "Requirements for Sampling, Testing and Data Analysis of Dredged Material" were reviewed to address these sediment issues (1989). This report expands upon the USACE procedure by considering other properties (color, compactability, etc.) of upland borrow material, which are not formally considered by the USACE in published guidelines.

Number of Sample Locations, Sampling Procedure, and Testing

Sediments will be sampled at each potential sand source location. The gradation of this material will be compared to the gradation of the existing beach sites. This section recommends the number of samples to be collected, collection sites, sampling procedure, testing, and data analysis and display to evaluate sediment size compatibility for the Program.

In the absence of formal guidelines, the USACE (1989) specifies the number of locations to be sampled at each borrow site, N, as

$$N = A^{1/2}/50 \qquad (1)$$

in which A is the plan area of the borrow site in square yards (about 1.5 sample stations per acre). The USACE notes that in no case will less than three sampling locations be acceptable. The USACE (1989) does not specify the procedure for taking samples of potential beach fill material on land. Samples from a proposed dredge area are taken to the proposed depth of dredging plus 2 feet. For the purposes of sampling potential sand source sites on land, the sampling program should be consistent with the USACE Equation (1) sampling density, and one sample at each location be obtained below the soil horizon (at either mid-depth or at the bottom of the excavation). All samples will be sieved in accordance with American Society for Testing and Materials (ASTM) D 422-63 (Test Method of Particle-Size Analysis of Soils, ASTM 1999).

This procedure can be used as an initial guideline, but should be reconsidered for specific conditions, with additional samples taken as necessary. Additional samples could be required based on variable stratigraphy. However, most potential sand sources are flood control debris basins, which are located in previously undeveloped areas so the USACE guidelines may be appropriate.

Data Analysis

A composite grain size distribution curve of the sediment samples collected from the source shall be prepared. A composite gradation is the mean gradation of all material sampled in the source area. If, by visual observation, individual samples appear dissimilar in size and character, each distinctive area will be analyzed independently. Stipulations may be given by BEACON on which borrow material from a site may be used as beach fill.

Beach Fill with More than 10% Fines – Proposed Criteria for the Program

The USACE (1989) stipulates that further testing to evaluate the chemical composition of the material may be required if material contains more than 10% fines (silt and clay passing the #200 sieve or less than 0.074 mm in diameter). BEACON proposes use of material with between 20 to 35 % fines.

Beach Fill with More Than 10% Coarse Grains By Volume

Beach fill material with a relatively high percentage of coarse grains will only be acceptable if the particles are no larger than cobble-sized, and do not constitute greater than 10% of the volume of the beach fill, with the exception of Surfer's Point. Beach fill material containing more than 10% cobble-sized particles is desirable for placement at the Surfer's Point beach fill site because the existing beach sediment already contains a high volume of cobble material (Refer to Section 3.4).

The proposed percentage of fine-grained sediment for the program (25% to 35%, depending on the site) is relatively low compared to natural sediment delivery from streams in the region. Also, the absolute quantity of fine-grained material proposed for beach placement over a year as part of the program is well below the quantity of fines delivered annually from local streams. Table 4.2 shows natural sediment delivery rates compared to those proposed by BEACON. The table indicates that the annual quantity of fines proposed by BEACON for beach placement is approximately 30% of that delivered by streams under existing conditions, and the total volume of proposed material is approximately 62% of that delivered by streams annually. Streams typically deliver sediment that consists of 70% fines and 30% other materials (including sand). Therefore, the quantity of fines deposited at the beach under natural sediment delivery far exceeds that proposed by the program.

Table 4.2. Natural Sediment Delivery Compared to Proposed Sediment Volumes.

Natural Sediment Delivery				Proposed Sedimentation by BEACON			
Sand Source	**Sand (cy)**	**Fines (cy)** [1]	**Total (cy)**	**Beach Fill Site**	**Proposed Minimum Sand (cy)**	**Proposed Maximum Fines (cy)** [2]	**Total (cy)**
Santa Barbara	170,000	400,000	570,000	*Goleta Beach*	*75,000*	*25,000*	*100,000*
				Ash Avenue	*75,000*	*25,000*	*100,000*
				Oil Piers	*178,750*	*96,250*	*275,000*
				Sub-Total	328,750	146,250	475,000
Ventura River	80,000	190,000	270,000	Surfer's Point	113,750	61,250	175,000
Santa Clara River	380,000	920,000	1,300,000	*Oxnard Shores*	*162,500*	*87,500*	*250,000*
				Hueneme Beach	*162,500*	*87,500*	*250,000*
				Sub-Total	325,000	175,000	500,000
TOTALS	**630,000**	**1,510,000**	**2,140,000**	**TOTALS**	**767,500**	**382,500**	**1,150,000**

Source: Noble Consultants, 1989
(1) Assumes 70% fines per BEACON report (1989) for the Santa Clara River.
(2) 25% for Goleta Beach and Ash Avenue and 35% for all other beach fill sites.

4.2.3 Color

Beach fill material will be consistent in color with existing beach sand after the material has been washed and reworked by waves, bleached under exposure to the sun and the marine environment, and mixed with the existing sand. The USACE *Shore Protection Manual* (USACE 1984) states that "...fill material darkened by organic material (Surfside/Sunset Beach, California) or "reddened" by oxidized clay minerals (Imperial Beach, California) will be bleached quickly by the sun to achieve a more natural beach color."

As demonstrated by the Ponto Beach demonstration project in Ponto Beach, California (Sherman, *et al.* 1998), beach fill that is significantly darker in color then the existing beach will be rapidly reworked by waves if placed seaward of the mean high tide line, leaving the material that is sand-sized and sand-colored on the beach and in the nearshore environment. However, if BEACON chooses to proactively address color changes prior to beach placement, several planning options are available. The options include designing the project to place the material below the mean high tide line during construction, and/or implementation of a public information program (See Section 3.0). It is important to note, however, that color incompatibility alone presents no adverse physical or chemical effects to the coastal environment. As a result, material lacking in color compatibility will still be considered as a candidate for beach fill.

4.2.4 Particle Shape

Particle shape shall be considered in approving beach fill. Material is to be examined to identify whether particles are rounded or angular in shape. Rounded particles are acceptable for beach fill because they most closely resemble native beach materials. Angular particles are not acceptable for beach fill because sharp points and edges may cause discomfort while walking, sitting, or lying on the beach, thereby affecting the aesthetic qualities of the beach (USACE 1984). A sample from each potential beach fill source is to be visually examined for particle shape. Acceptable material must be composed of 90%-rounded particles as estimated visually. Any source containing greater than 10% of angular particles may be rejected.

4.2.5 Debris

Most beach fill material will be generated from the flood control debris basins and will need to be cleaned of debris (trash, wood, vegetation, etc.). Also, material obtained from streambeds or river courses may require screening of debris. The screening can be done by mechanically sifting the material through a coarse mesh to catch debris at the site and further reworked using conventional earthmoving equipment (Chambers 1992). Visual inspection of the source location will be adequate for BEACON to identify whether debris screening is necessary. Debris screening would be necessary if numerous trash or litter deposits are visible within the source area and debris appears significant.

4.2.6 Compactability/Moldability of Proposed Beach Fill Material

Material that contains a visible component of iron oxides (a brown/red color) has a tendency to form a hardpan when placed on the dry beach. Material with the tendency to form a hardpan will be placed seaward of the mean high tide line to be reworked by waves. Reworking by waves will result in rapid winnowing of fines from the beach fill leaving beach sand behind while fines are transported away from the site by currents.

4.3 TRANSPORTATION METHODS

Beach fill activities may occur on short notice and when material becomes available. Transportation of the sediment will be by trucks, train, dredge, conveyors, or other suitable means.

4.3.1 Trucking

Trucking of suitable beach sand from potential sand sources will probably be the most efficient transportation method for most sand source sites. Table 4.3 outlines the estimated number of truck trips and frequency for each beach fill site, based on trucking the maximum proposed volume at each site over a year. The majority of the flood control debris basins are located sufficient distance to the beach fill sites that trucking would be the only feasible option. Other potential sources that may require trucking to transport the material to the beach include upland construction projects, dam decommissioning on the Ventura River, Mugu Lagoon restoration projects, Callegus Creek sediment disposal projects, and landslide material.

If trucks are used to transport sand, a typical scenario may include the following: Trucks would haul material from the sand source site (debris basin, construction site, etc.) along a designated route to the placement sites as shown in an example traffic route plan on Figure 4-7 and Figure 4-8. Temporary construction access routes may have to be created on the beach to enable trucks to move onto the beach without becoming stuck in the sand. Sand will be redistributed along the beach using earthmoving equipment such as bulldozers and scrapers. Trucks will generate added traffic and noise along the haul route, and may cause residents a temporary inconvenience during sand delivery. Noise levels may be temporarily increased during construction from heavy equipment hauling and spreading material. All operations will follow local noise ordinances and hours of operation are specified in the ordinances.

4.3.2 Train

The beach fill sites at Oil Piers and Hueneme Beach are located adjacent to the railroad tracks, adding this optional transportation mode. The Hueneme Beach fill site is ideally situated for this type of operation as a rail line runs directly into Port Hueneme. Material can reach these sites by train and can be sidecar-dumped directly onto the beach or conveyed from the railcar by a belt system, where scrapers and/or loaders could transport the material to the placement site and create the design beach template. The estimated sand quantity that can be delivered over time and the number of required train trips is shown in Table 4.4. This table provides an estimate and is subject to approval by the Union Pacific Railroad.

Table 4.3. Estimated Number of Truck Trips and Frequency [6]

Placement Site	Season	Maximum Volume of Sand Placed Seasonally (cy)	Estimated Volume of Sand Placed Weekly (cy)	Estimated Weekly Number of Truck Trips Projected [1]	Estimated Daily Number of Truck Trips Projected [2]	Estimated Hourly Number of Truck Trips Projected [3]	Time Between Trips, on Average (minutes)
Goleta Beach	Fall/ Winter	100,000	6,700 [4]	476	79	7.9	7.5
	Spring/Summer	0	--	--	--	--	--
Ash Avenue	Fall/ Winter	100,000	6,700 [4]	476	79	7.9	7.5
	Spring/Summer	0	--	--	--	--	--
Oil Piers	Fall/ Winter	183,300	12,200 [4]	871	145	14.5	4.1
	Spring/Summer	91,700	13,100 [4]	935	156	15.6	3.8
Surfer's Point	Fall/ Winter	116,700	7,800 [4]	557	92.9	9.3	6.5
	Spring/Summer	58,300	8,300 [4]	595	99.1	9.9	6.0
Oxnard Shores	Fall/ Winter	250,000	12,500 [5]	893	148.8	14.9	4.0
	Spring/Summer	0	--	--	--	--	--
Hueneme Beach	Fall/ Winter	250,000	12,500 [5]	893	148.8	14.9	4.0
	Spring/Summer	0	--	--	--	--	--

(1) Assumes a twin trailer belly-dump truck holding 14 cy total.

(2) Assumes a 6-day workweek, Monday through Saturday.

(3) Assumes a 10-hour workday.

(4) Assumes a 15-week placement period during winter and a 7-week placement period during summer. (This table provides an estimated breakdown. A longer or shorter project placement period would alter the delivery rate and time between truck trips.)

(5) Assumes a 20-week placement period for Oxnard Shores and Hueneme Beach during winter placement only because of the large volume of sand proposed.

(6) These values are not proposed maximum limits, but as estimates of potential trucking scenarios.

Table 4.4. Estimated Rail Transport Summary [5], [6]

Placement Site	Season	Maximum Volume of Sand Placed Seasonally (cy)	Estimated Average Volume Per Train [1] [2] (cy)	Estimated Average Number of Trains Per Week [3] [4]	Estimated Volume of Sand Placed Weekly (cy)	Estimated Average Number of Weeks Per Season
Oil Piers	Fall/ Winter	183,300	4,000	2	8,000	23.0
	Spring/ Summer	91,700	4,000	2	8,000	11.5
Hueneme Beach	Fall/ Winter	250,000	5,400	2	10,800	23.0

(1) Assumes a railcar holds 67 cy.
(2) Assumes 60 railcars per train for Oil Piers and 80 for Hueneme Beach.
(3) Assumes an average of 7 hours to unload the train.
(4) Assumes a 6-day workweek, Monday through Saturday.
(5) All estimates are subject to approval and change by the Union Pacific Railroad.
(6) These values are not proposed maximum limits, but as estimates of potential trucking scenarios.

4.3.3 Dredging

Dredging is another method of transporting sand to the beach and is only feasible at specific locations that are located in close proximity to a beach fill site. These locations include the Goleta Slough, Carpinteria Marsh, Carpinteria Creek, and Ormond Slough. For example, the mouth of the Goleta Slough was dredged in 1995 and 200,000 cy of sediment was deposited on the beach. Currently, the SBCFCD is dredging approximately 25,000 cy from the slough.

4.3.4 Conveyor

Some potential sand source locations are located adjacent to the proposed beach fill sites. At some of these sites, conveyors may be a suitable means to transport material to the beach, then earth moving equipment can spread the sand onto the beach fill site. These sources which have potential of having sand transported via conveyors include Port of Hueneme construction or maintenance activities, Carpinteria Marsh, Carpinteria Slough, landslide material near the Oil Piers beach fill site, and at the Santa Clara River. Also, the Caltrans stockpile sites near the Oil Piers beach fill site maybe able to accommodate conveyors to transport material to the beach via the pedestrian underpasses.

4.4 STOCKPILE SITES

Potential stockpile sites exist within the project area. The stockpile sites are identified to act as temporary storage sites of suitable beach sand until an appropriate time and approval has been obtained for placement at a beach fill site. These sites are outlined in Table 4.5 and include: (1) the terminus of Ward Drive, near Goleta Beach; (2) Santa Monica Creek Debris Basin Site near the Ash Avenue Site; (3) two Caltrans stockpile sites inland of Highway 101 along the railroad near Oil Piers; (4) Ventura County Fairgrounds property adjacent to the Surfer's Point beach fill site; (5) on the back of the beach near Fifth Street at Oxnard Shores; and (6) on the

lighthouse promenade near Hueneme Beach. Additional sites may be identified over time as the program proceeds.

Table 4.5. Potential Stockpile Sites

Placement Site	Stockpile Site	Approximate Lot Size (1) (acres)	Approximate Volume (2) (cy)	Restrictions
Goleta Beach	Terminus of Ward Drive	2	40,000	May obstruct view
Ash Avenue	Santa Monica Debris Basin	1	20,000	Located far from beach
Oil Piers	Caltrans Stockpile Site #1	2	40,000	No material may be placed from November 1 to April 1
	Caltrans Stockpile Site #2	2	40,000	No material may be placed from November 1 to April 1
Surfer's Point	Ventura Co. Fairgrounds	<1	5,000	None
Oxnard Shores	Back of Beach	To be determined		
Hueneme Beach	Lighthouse Promenade	3	40,000	Long thin area along promenade

(1) Lot size is the approximate area available for stockpile of material.
(2) Approximate volume is calculated assuming a 10-ft high stockpile within the area delineated.

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Dec. 2000
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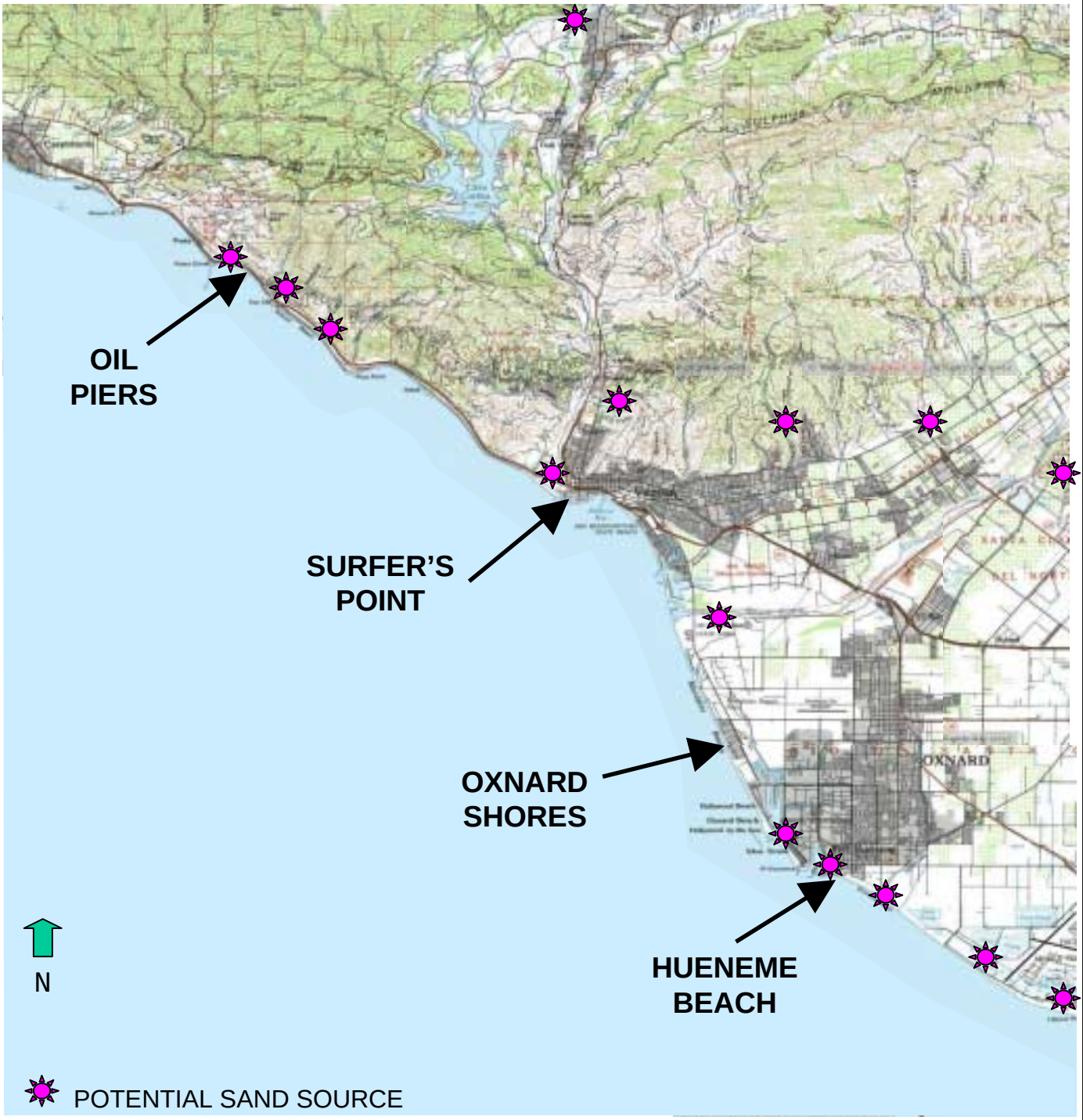
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Potential Sand Source Locations in Santa Barbara County	Figure 4-1



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Dec. 2000
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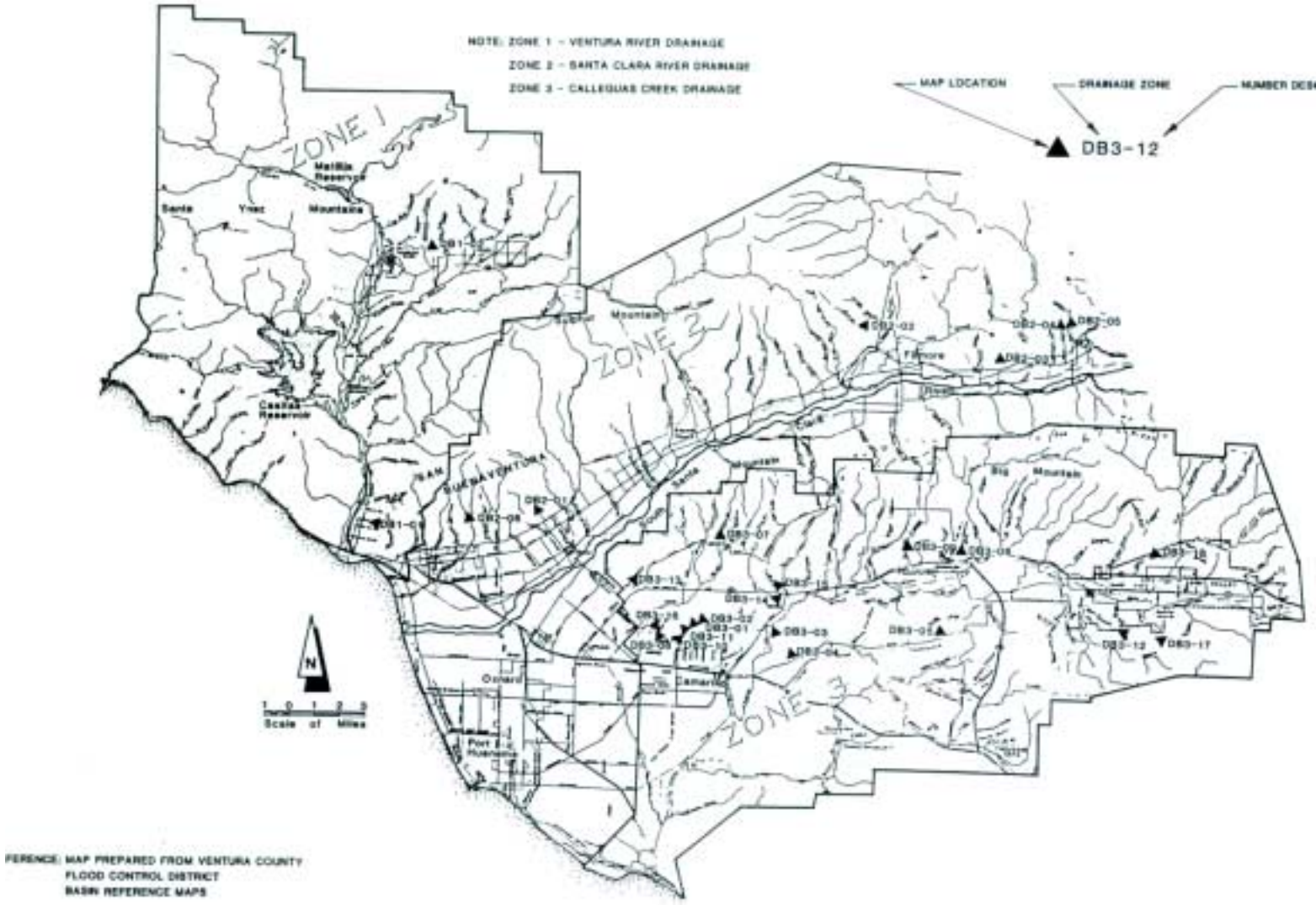
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Potential Sand Source Locations in Ventura County	Figure 4-2



FERENCE: MAP PREPARED FROM VENTURA COUNTY FLOOD CONTROL DISTRICT BASIN REFERENCE MAPS

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Dec. 2000
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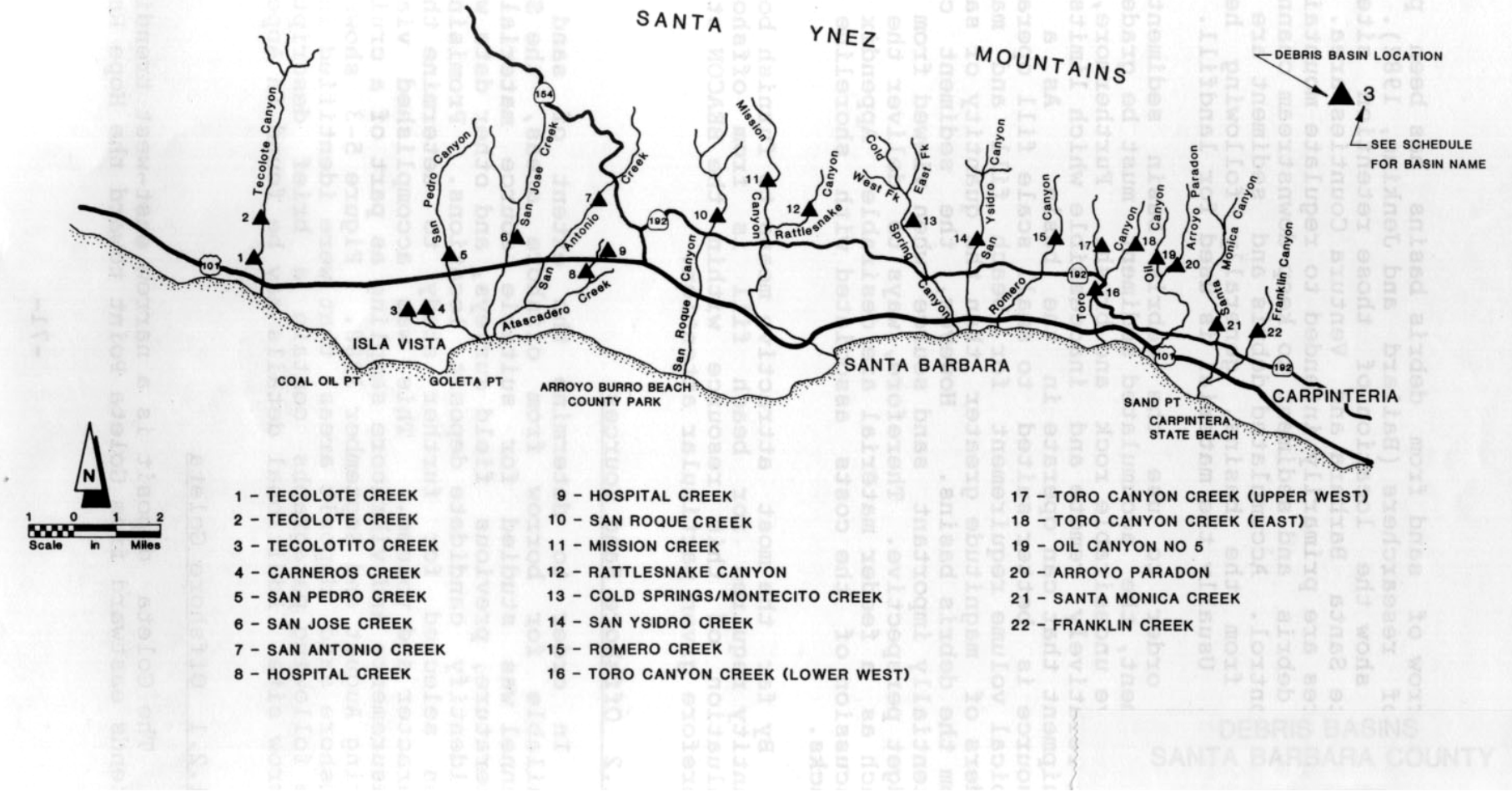
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Debris Basins in Santa Barbara County	Figure 4-3



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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Debris Basins in Santa Barbara County	Figure 4-4

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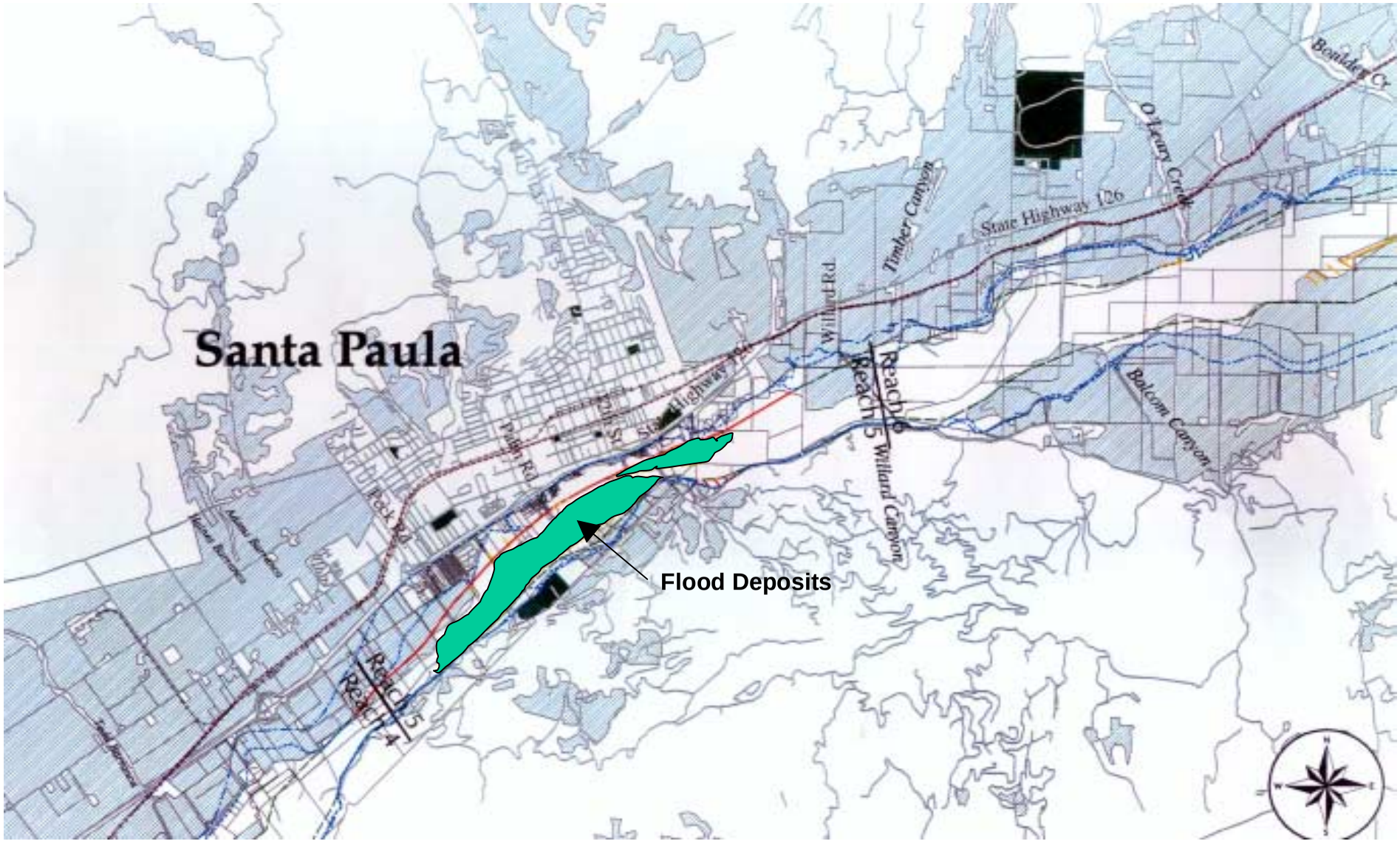
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Gobernador Debris Basin Santa Barbara County	Figure 4-5



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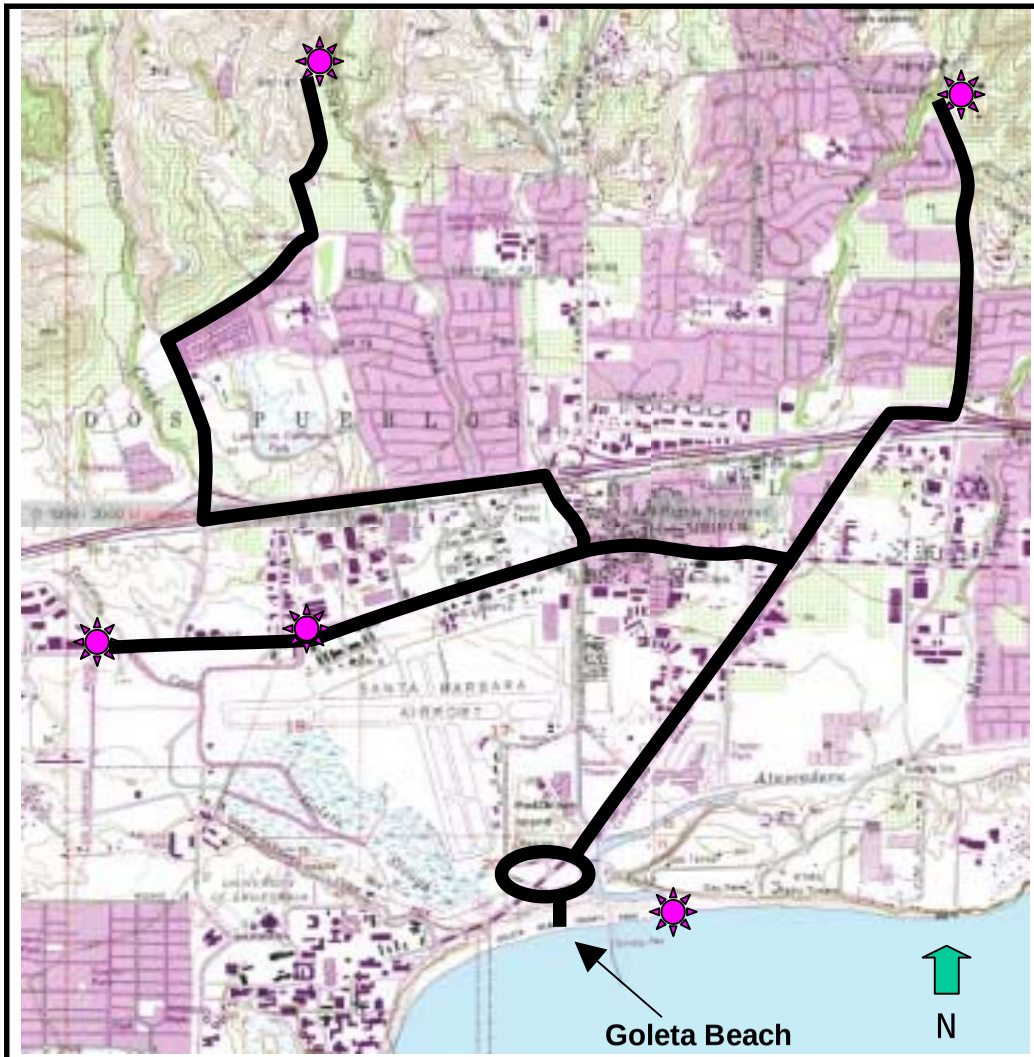
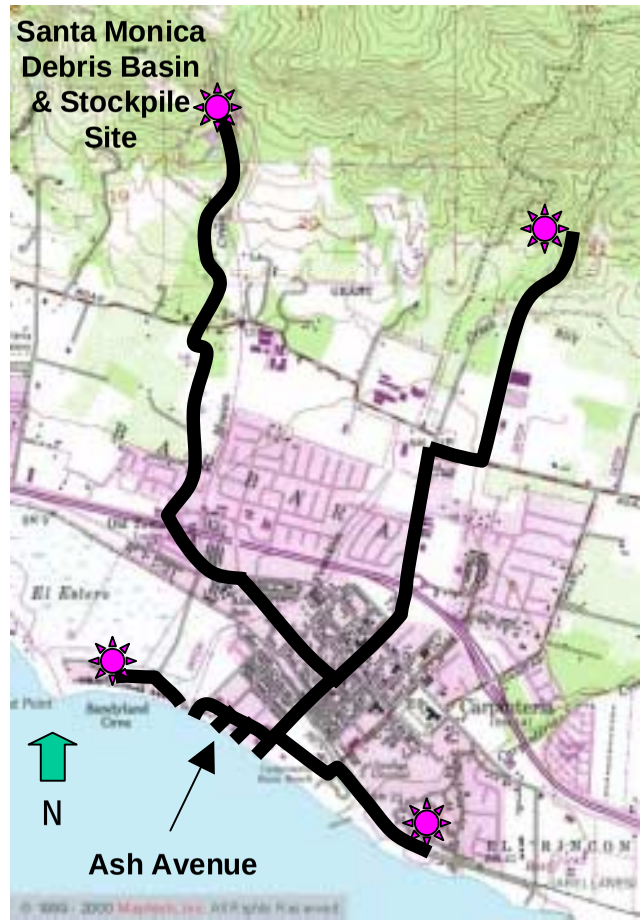
SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Flood Deposits Identified in the Santa Clara River Enhancement and Management Plan	Figure 4-6





POTENTIAL SAND SOURCE

POTENTIAL TRUCK ROUTE

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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Potential Truck Routes for Santa Barbara County	Figure 4-7

Prepared by: Moffatt & Nichol Engineers
Dec. 2000
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SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM	Potential Sand Source Locations in Ventura County	Figure 4-8

5.0 MONITORING

Both physical and biological monitoring are proposed as part of this program. A detailed biological assessment was conducted by the Chambers Group, Inc. for each of the six beach fill sites and is included in Appendix B. Each project site possesses different environmental resources therefore, each beach fill site will have its own monitoring program tailored to address them. Physical monitoring will be conducted at each of the beach fill sites and will include beach profiling and turbidity monitoring. Table 5.1 summarizes the proposed monitoring activities for each site.

Table 5.1. Summary of Proposed Monitoring Activities

Placement Site	Kelp	Reef	Eelgrass	Grunion	Turbidity	Beach Profile
Goleta Beach	X		X		X	X
Ash Avenue	X	X			X	X
Oil Piers	X	X		X	X	X
Surfer's Point					X	X
Oxnard Shores				X	X	X
Hueneme Beach					X	X

5.1 GOLETA BEACH

Goleta Beach is one of the more environmentally sensitive sites. However, due to direct interaction with the project biologist, the project has been proactively designed to minimize potential impacts to sensitive resources in the area.

5.1.1 Biological Monitoring

An underwater survey shall be conducted prior to beach enhancement at Goleta Beach to determine if an eelgrass bed still occurs offshore from the beach. If an eelgrass bed is observed, a baseline survey shall be conducted to determine the present health of the bed. The baseline survey shall establish reference stakes to measure sand deposition and permit transects to measure eelgrass. Along each transect the eelgrass density, percent cover of eelgrass, length of

eelgrass blades above sand, and general health of eelgrass following information shall be recorded.

The survey shall be repeated following beachfill operations and again at the end of the summer season during the period of maximum sand cover. If project-generated sand deposition is observed to be adversely affecting the eelgrass bed, subsequent beach fill activities at Goleta Beach shall either be modified in a way to prevent deposition of sand in the eelgrass bed or ceased entirely at this site. If the project is observed to cause extensive damage to the eelgrass bed resulting in a loss of plants, additional mitigation may be required.

5.1.2 Physical Monitoring

The Goleta Beach fill site is located just west of the mouth of the Goleta Slough and sediment may move towards the mouth of the slough and cause it to close. The Santa Barbara County Flood Control District currently reopens the mouth of the Slough three to four times a year. The mouth of Goleta Slough shall be monitored during and after beach fill operations at Goleta Beach. If monitoring indicates that the slough mouth is closed as a result of beach fill activities, BEACON proposes to reopen the slough mouth with bulldozers.

To prevent impacts to the kelp beds located downcoast of the Goleta beach fill site, turbidity monitoring will be conducted. It is proposed that turbidity monitoring will be conducted during construction of the beach fills by visual observation to ensure that the turbidity plume does not increase significantly over ambient conditions for an extended duration and area. Beach profile surveys will be conducted prior to and after construction of beach fill operations to track the movement and retention of sand. Methods for collecting profile data should be consistent with previous profiling efforts to ensure the data are comparable over time.

5.2 ASH AVENUE (CARPINTERIA BEACH)

Ash Avenue is also an environmentally sensitive site, therefore biological monitoring will be conducted on the Carpinteria Reef located upcoast of the proposed beach fill location, the intertidal habitat located downcoast, and visual monitoring for potential impacts to the Carpinteria Marsh inlet from closure.

5.2.1 Biological Monitoring

Carpinteria Reef. The Carpinteria Reef will be monitored for potential sedimentation and health. Beach fill is proposed during the Fall-Winter only, when the littoral drift is predominately to the south; therefore, sand burial of the reef should not occur. An intertidal reef is located downcoast and will be monitored for potential sand burial. BEACON will coordinate with researchers from the University of California at Santa Barbara (UCSB) who are conducting a long-term monitoring program at Carpinteria Reef. A baseline shall be established prior to beach fill activities at Ash Avenue. The baseline will include installing reference stakes to measure sand deposition. Permanent transects shall be established to monitor the percentage of sand and rock substrate along each transect, sand height over the reef, percent cover of sand and organisms on rocks, density of kelps and large invertebrates, density of life stages of kelp, and observations on health of kelp and other organisms.

The survey shall be repeated following beachfill operations and again at the end of the summer season during the period of maximum sand cover. If project-generated sand deposition is observed to be affecting adversely the reef, subsequent beach fill activities at Ash Avenue shall either be modified in a way to prevent deposition of sand on Carpinteria Reef or ceased entirely at this site. If the project is observed to cause extensive damage to the reef resulting in a loss of kelp plants or hard bottom habitat, additional mitigation may be required.

Rocky Intertidal Habitat off Carpinteria State Beach. The rocky intertidal habitat off Carpinteria State Beach will be monitored for sedimentation and health. BEACON will coordinate with researchers from the University of California at Santa Barbara (UCSB) who are conducting a long-term monitoring program at Carpinteria State Beach. A baseline shall be established prior to beach fill activities at Ash Avenue. The baseline will include installing reference stakes to measure sand deposition. Permanent transects shall be established to monitor sand height over the reef and surfgrass, percentage of sand and rock substrate along each transect, percent cover of sand and organisms on rocks, percent cover of surfgrass, and blade length of surfgrass.

The survey shall be repeated following beachfill operations and again at the end of the summer season during the period of maximum sand cover. The data from the surveys will be analyzed to identify any long-term changes from the project as well as short-term seasonal variations. If project-generated sand deposition is observed to be affecting adversely the rocky intertidal habitat, subsequent beach fill activities at Ash Avenue shall either be modified in a way to prevent deposition of sand on the rocky intertidal habitat at Carpinteria State Beach or ceased entirely at this site.

5.2.2 Physical Monitoring

The mouth of Carpinteria Creek shall be monitored during and after beach fill operations at Ash Avenue. If sand from the BEACON South Central Coast Beach Enhancement Program is observed to close the mouth of the Creek, BEACON will reopen the mouth with a bulldozer.

It is proposed that turbidity monitoring will be conducted during construction of the beach fills by visual observation to ensure that the turbidity plume does not increase significantly over ambient conditions for an extended duration and area. Beach profile surveys will be conducted prior to and after construction of beach fill operations to track movement and retention of sand.

5.3 OIL PIERS

5.3.1 Biological Monitoring

Kelp Bed. The kelp offshore Oil Piers will be monitored for sedimentation and health. A baseline shall be established prior to beach fill activities at Oil Piers. The baseline will include installing reference stakes to measure sand deposition. Permanent transects shall be established to monitor the percentage of sand and rock substrate along each transect, sand height over the reef, percent cover of sand and organisms on rocks, density of kelps and large invertebrates, density of life stages of kelp, and observations on health of kelp and other organisms.

The survey shall be repeated following beachfill operations and again at the end of the summer season during the period of maximum sand cover. If project-generated sand deposition is observed to be affecting adversely the reef, subsequent beach fill activities at Oil Piers shall either be modified in a way to prevent deposition of sand on the kelp bed or ceased entirely at this site. If the project is observed to cause extensive damage to the reef resulting in a loss of kelp plants or hard bottom habitat, additional mitigation may be required.

Rocky Intertidal Habitat off Mussel Shoals. The rocky intertidal habitat off Mussel Shoals upcoast from the Oil Piers site will be monitored for sedimentation and health. A baseline shall be established prior to beach fill activities at Oil Piers. The baseline will include installing reference stakes to measure sand deposition. Permanent transects shall be established to monitor the sand height over the reef and surfgrass, percentage of sand and rock substrate along each transect, percent cover of sand and organisms on rocks, percent cover of surfgrass, and blade length of surfgrass.

The survey shall be repeated following beachfill operations and again at the end of the summer season during the period of maximum sand cover. If project-generated sand deposition is observed to be affecting adversely the rocky intertidal habitat, subsequent beach fill activities at Oil Piers shall either be modified in a way to prevent deposition of sand on the rocky intertidal habitat at Mussel Shoals or ceased entirely at this site.

Grunion. If beachfill is planned to occur during the grunion spawning season of March to September, a biological monitor shall be onsite during any predicted grunion runs within two weeks before or during the planned beach fill. If grunion are observed to spawn during the spring high tides immediately prior to the proposed sand placement or during sand placement operations, all beach fill activities will be curtailed until after the next spring high tide series when the grunion eggs will have hatched and been carried into the ocean. In addition, sand berms will be placed around the spawning area, if possible. The buffer zone would be kept in place until the next predicted grunion run (about 14 days) to allow for the eggs to hatch and surveys to show that no subsequent spawning occurred in the area.

5.3.2 Physical Monitoring

It is proposed that turbidity monitoring will be conducted during construction of the beach fills by visual observation to ensure that the turbidity plume does not increase significantly over ambient conditions for an extended duration and area. Beach profile surveys will be conducted prior to and after construction of beach fill operations to track movement and retention of sand.

5.4 SURFER'S POINT

5.4.1 Biological Monitoring

There are no sensitive habitats located within or near the Surfer's Point beach fill site. However, steelhead trout are found in the Ventura River upcoast of the beach fill site. Therefore, as part of the monitoring the mouth of the Ventura River shall be monitored during and after beach fill operations at Surfer's Point. If construction causes closure of the mouth BEACON proposes to reopen the mouth using a bulldozer to insure no adverse impacts to steelhead trout.

5.4.2 Physical Monitoring

It is proposed that turbidity monitoring will be conducted during construction of the beach fill by visual observation to ensure that the turbidity plume does not increase significantly over ambient conditions for an extended duration. Beach profile surveys will be conducted prior to construction and after construction of beach fill operations to track movement and detention of sand.

5.5 OXNARD SHORES

5.5.1 Biological Monitoring

Oxnard Shores beach is located at near nesting sites for California Least Terns and Western Snowy Plovers. However beach fill placement is proposed during the Fall-Winter season and will not impact the nesting of these birds. Therefore, no monitoring is proposed.

Grunion spawning runs will be monitored during beach fill construction if beach fill operations are conducted during grunion spawning. If grunion are observed, then construction activities will be halted until the spawn has been completed. In addition, sand berms will be placed around the spawning area, if possible. The buffer zone would be kept in place until the next predicted grunion run (about 14 days) to allow for the eggs to hatch and surveys show that no subsequent spawning occurred in the area. A report will be prepared within two weeks of the completion of each grunion survey and submitted to BEACON and the appropriate wildlife and regulatory agencies.

5.5.2 Physical Monitoring

It is proposed that turbidity monitoring will be conducted during construction of the beach fill by visual observation to ensure that the turbidity plume does not increase significantly over ambient conditions for an extended duration. Beach profile surveys will be conducted prior to construction and after construction of beach fill operations to track movement and retention of sand.

5.6 HUENEME BEACH

5.6.1 Biological Monitoring

As with Oxnard Shores, the Hueneme beach fill site is located near nesting sites for Least Terns and Snowy Plovers. Since the proposed beach fill activities will be conducted during the Fall-Winter season, no Least Tern or Snowy Plover monitoring is required.

5.6.2 Physical Monitoring

It is proposed that turbidity monitoring will be conducted during construction of the beach fill by visual observation to ensure that the turbidity plume does not increase significantly over ambient conditions for an extended duration. Beach profile surveys will be conducted prior to construction and after construction of beach fill operations to track movement and detention of sand.

6.0 FUTURE ACTIONS

As future actions of this program BEACON proposes to prepare and implement a set of guidelines, and prepare a compliance protocol document.

6.1 IMPLEMENTATION GUIDELINES

A set of guidelines will be prepared and submitted for use by local agencies to assess beach fill opportunities for suitability as opportunistic sand and to implement projects. The guidelines will be prepared in the form of a handout that can be given to the general public. The handout will describe the goals and rationale for the program and the procedure needed to determine the compatibility of potential borrow site sediments. A checklist may also be developed for local agency staff to use in assessing material sources as they come on-line through the project application process. A copy of the checklist is attached as Appendix C to this report.

The guidelines will specify acceptable material criteria such as grain size, percent fines, color, chemistry, compaction properties, particle shape, content, and require information of land use history of the site and adjacent sites, the depositional environment, material location, and quantity. The guidelines will also be instructions to local agency staff to use in reviewing potential sand opportunities. It will be geared toward enabling the layperson to identify a candidate source for opportunistic sand that can be further reviewed by BEACON staff as needed and presented to permit agencies.

6.2 COMPLIANCE PROTOCOL DOCUMENT

When a nourishment project is proposed or carried out, BEACON will need a protocol to verify compliance with permit requirements. The compliance protocol document will be prepared to serve as a set of instructions to local agency staff of how to carry out a project and remain consistent with permit requirements. Permit conditions may change over time and the compliance protocol document may need to be a "living" document that is periodically updated over the life of the program.

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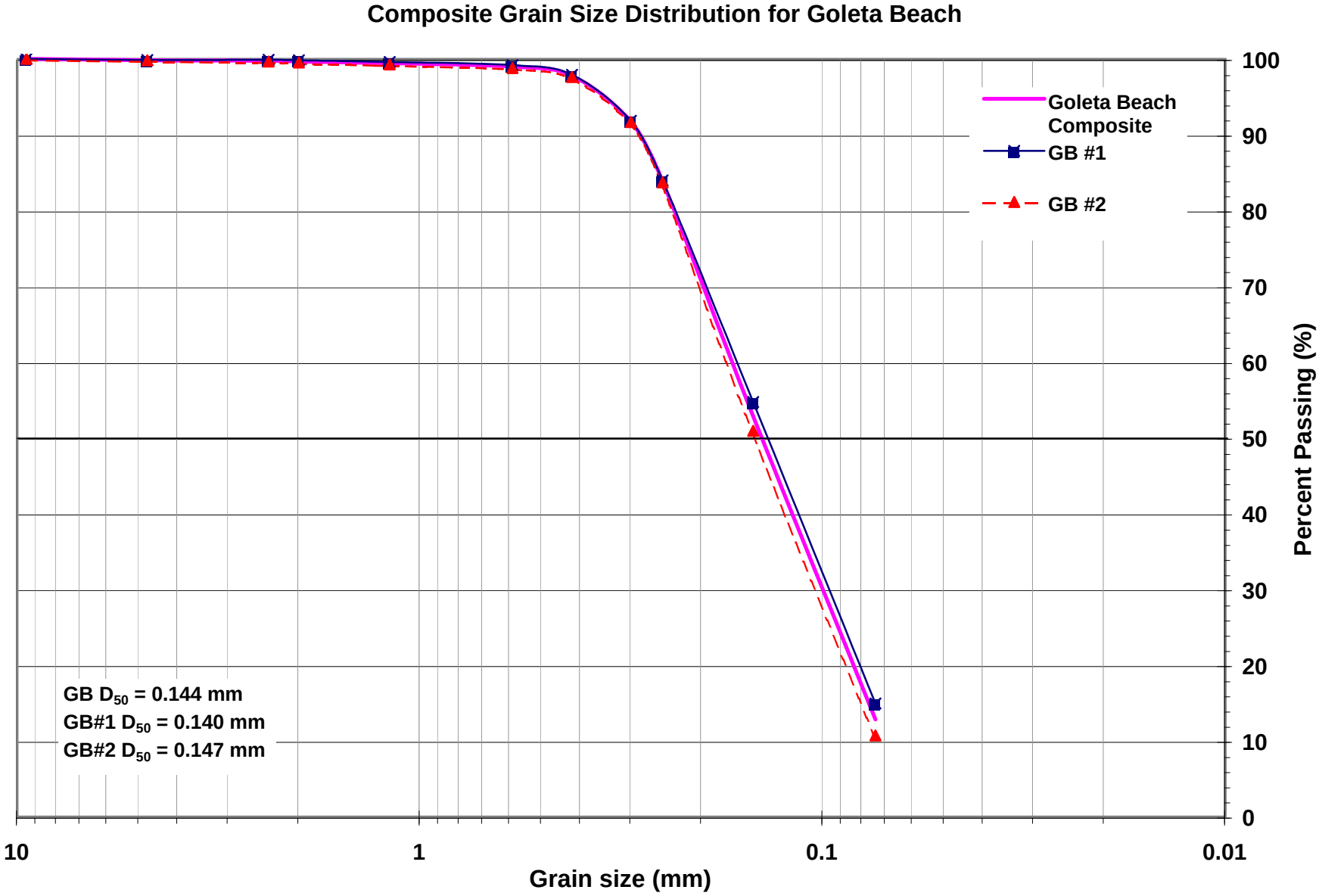
APPENDIX A
GRAIN SIZE ANALYSIS FOR THE SIX BEACH FILL SITES

BEACON
GOLETA BEACH - NATIVE GRAIN SIZE
JOB NO.: 4687

GB #1										
SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE4	4.76	100.00	100.00	100.00	98.70	100.00	100.00	100.00	100.00	99.84
SIEVE8	2.38	100.00	100.00	99.70	99.30	100.00	100.00	100.00	100.00	99.88
SIEVE10	2	100.00	100.00	99.70	99.00	100.00	99.90	99.90	100.00	99.81
SIEVE16	1.19	99.70	99.70	99.40	98.60	99.80	99.80	99.80	99.90	99.59
SIEVE30	0.59	99.30	98.70	99.10	97.60	99.60	99.70	99.70	99.70	99.18
SIEVE40	0.42	97.90	95.40	95.70	96.60	98.90	99.70	99.60	99.30	97.89
SIEVE50	0.3	83.20	72.20	90.10	92.90	97.80	99.70	99.60	99.00	91.81
SIEVE60	0.25	60.10	49.70	80.70	88.40	96.30	99.30	99.30	97.90	83.96
SIEVE100	0.149	7.70	6.00	8.10	50.30	78.40	97.90	96.40	93.00	54.73
SIEVE200	0.074	0.00	0.70	0.60	1.40	4.50	38.60	38.60	35.00	14.93
84	**% (in mm)**	**0.307**	**0.361**	**0.268**	**0.238**	**0.181**	**0.131**	**0.133**	**0.137**	**0.250**
50	**% (in mm)**	**0.231**	**0.251**	**0.207**	**0.148**	**0.120**	**0.088**	**0.089**	**0.093**	**0.140**
16	**% (in mm)**	**0.165**	**0.172**	**0.160**	**0.096**	**0.086**	**0.031**	**0.031**	**0.034**	**0.076**

GB #2										
SIEVE	SIZE (mm)	Berm	+4 ft	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE4	4.76	100.00	100.00	99.70	98.70	100.00	100.00	100.00	100.00	99.80
SIEVE8	2.38	99.90	99.90	99.70	98.10	99.60	100.00	99.90	100.00	99.64
SIEVE10	2	99.60	99.80	99.70	98.10	99.20	100.00	99.70	100.00	99.51
SIEVE16	1.19	99.30	99.70	99.40	97.80	98.90	99.60	99.40	99.90	99.25
SIEVE30	0.59	99.10	98.80	98.70	97.50	98.50	99.20	98.70	99.90	98.80
SIEVE40	0.42	97.60	95.90	97.80	95.50	97.70	98.50	98.10	99.80	97.61
SIEVE50	0.3	81.90	73.30	94.30	91.70	97.00	97.70	97.70	99.70	91.66
SIEVE60	0.25	59.00	46.50	87.30	86.00	96.20	97.70	97.40	99.40	83.69
SIEVE100	0.149	6.60	1.80	5.70	36.30	88.60	89.50	89.00	89.70	50.90
SIEVE200	0.074	0.60	0.00	0.00	2.50	15.20	25.60	23.90	17.90	10.71
84	**% (in mm)**	**0.316**	**0.357**	**0.246**	**0.246**	**0.144**	**0.143**	**0.143**	**0.143**	**0.252**
50	**% (in mm)**	**0.233**	**0.257**	**0.204**	**0.177**	**0.110**	**0.103**	**0.104**	**0.108**	**0.147**
16	**% (in mm)**	**0.167**	**0.181**	**0.162**	**0.104**	**0.075**	**0.046**	**0.050**	**0.066**	**0.084**

Goleta Beach Composite		
SIEVE	SIZE (mm)	Composite
		Percent Passing
SIEVE3/8"	9.5	100.00
SIEVE4	4.76	99.82
SIEVE8	2.38	99.76
SIEVE10	2	99.66
SIEVE16	1.19	99.42
SIEVE30	0.59	98.99
SIEVE40	0.42	97.75
SIEVE50	0.3	91.74
SIEVE60	0.25	83.83
SIEVE100	0.149	52.81
SIEVE200	0.074	12.82
84	**% (in mm)**	**0.251**
50	**% (in mm)**	**0.144**
16	**% (in mm)**	**0.080**


Composite Grain Size Distribution for Goleta Beach
Goleta Beach Composite
GB #1
GB #2
GB D_{50} = 0.144 mm
GB#1 D_{50} = 0.140 mm
GB#2 D_{50} = 0.147 mm
100
90
80
70
60
50
40
30
20
10
0
Percent Passing (%)
10
1
0.1
0.01
Grain size (mm)

BEACON
ASH AVENUE BEACH - NATIVE GRAIN SIZE
JOB NO.: 4687

AA#1

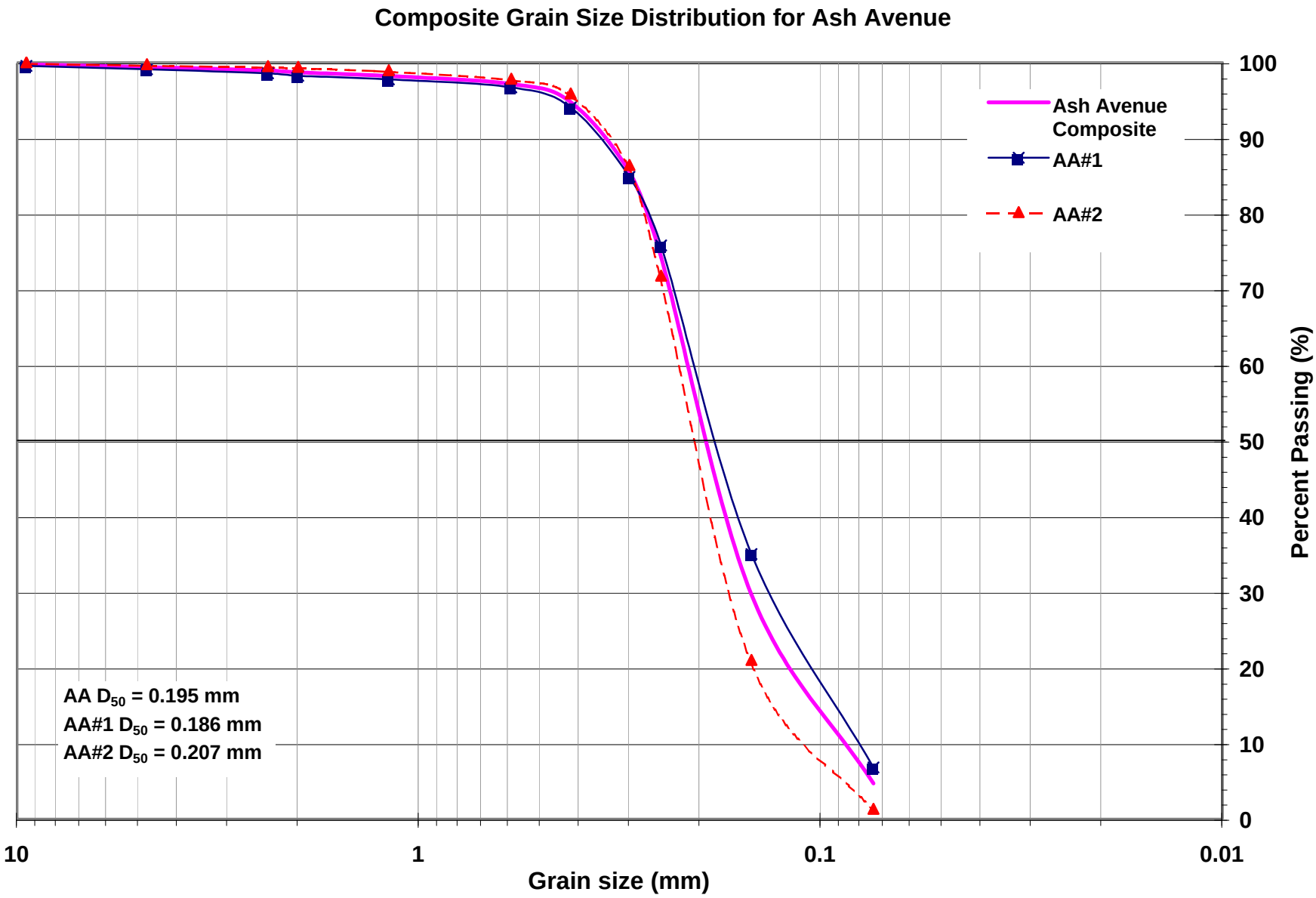
SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	100.00	100.00	100.00	100.00	100.00	96.10	100.00	99.51
SIEVE4	4.76	100.00	100.00	100.00	99.30	99.30	100.00	94.10	100.00	99.09
SIEVE8	2.38	100.00	100.00	100.00	98.90	98.60	100.00	90.80	100.00	98.54
SIEVE10	2	100.00	100.00	100.00	98.50	97.90	100.00	89.50	99.90	98.23
SIEVE16	1.19	99.60	100.00	99.60	98.20	97.50	99.50	87.60	99.80	97.73
SIEVE30	0.59	99.10	98.20	99.20	97.80	96.80	99.00	84.30	99.10	96.69
SIEVE40	0.42	96.90	86.20	97.30	95.60	96.10	98.50	83.00	98.60	94.03
SIEVE50	0.3	79.20	53.30	84.40	91.20	94.40	98.10	81.00	97.20	84.85
SIEVE60	0.25	55.30	32.30	70.30	86.10	90.80	97.60	78.40	95.40	75.78
SIEVE100	0.149	5.00	2.40	13.30	35.80	48.60	82.50	62.70	29.60	34.99
SIEVE200	0.074	0.60	0.30	0.00	0.70	2.80	3.90	43.10	2.80	6.78
84	**% (in mm)**	**0.333**	**0.412**	**0.299**	**0.246**	**0.234**	**0.159**	**0.551**	**0.233**	**0.295**
50	**% (in mm)**	**0.239**	**0.292**	**0.214**	**0.178**	**0.152**	**0.118**	**0.100**	**0.180**	**0.186**
16	**% (in mm)**	**0.171**	**0.195**	**0.154**	**0.107**	**0.096**	**0.086**	**0.027**	**0.111**	**0.099**

AA#2

SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	Rock Revetment	100.00	100.00	100.00	100.00	Cobble	Bedrock	100.00	100.00
SIEVE4	4.76		100.00	100.00	98.80	100.00			100.00	99.76
SIEVE8	2.38		100.00	100.00	97.50	100.00			100.00	99.50
SIEVE10	2		100.00	100.00	96.90	100.00			100.00	99.38
SIEVE16	1.19		100.00	100.00	95.70	99.30			99.70	98.94
SIEVE30	0.59		100.00	99.60	94.80	95.90			98.80	97.82
SIEVE40	0.42		98.70	97.70	93.30	91.50			98.20	95.88
SIEVE50	0.3		83.30	85.30	91.40	76.90			95.20	86.42
SIEVE60	0.25		55.30	68.50	87.10	57.10			91.00	71.80
SIEVE100	0.149		4.70	10.10	42.90	7.50			39.80	21.00
SIEVE200	0.074		0.70	0.80	1.20	1.40			2.40	1.30
84	**% (in mm)**		**0.305**	**0.296**	**0.243**	**0.358**			**0.236**	**0.292**
50	**% (in mm)**		**0.239**	**0.218**	**0.165**	**0.236**			**0.169**	**0.207**
16	**% (in mm)**		**0.172**	**0.159**	**0.101**	**0.166**			**0.101**	**0.130**

Ash Avenue Composite

SIEVE	SIZE (mm)	Composite
		Percent Passing
SIEVE3/8"	9.5	99.70
SIEVE4	4.76	99.35
SIEVE8	2.38	98.91
SIEVE10	2	98.67
SIEVE16	1.19	98.19
SIEVE30	0.59	97.12
SIEVE40	0.42	94.74
SIEVE50	0.3	85.45
SIEVE60	0.25	74.25
SIEVE100	0.149	29.61
SIEVE200	0.074	4.67
84	**% (in mm)**	**0.294**
50	**% (in mm)**	**0.195**
16	**% (in mm)**	**0.108**


Composite Grain Size Distribution for Ash Avenue
Ash Avenue Composite
AA#1
AA#2
AA D50 = 0.195 mm
AA#1 D50 = 0.186 mm
AA#2 D50 = 0.207 mm
100
90
80
70
60
50
40
30
20
10
0
Percent Passing (%)
10
1
0.1
0.01
Grain size (mm)

BEACON
OIL PIERS BEACH - NATIVE GRAIN SIZE
JOB NO.: 4687

OP#1

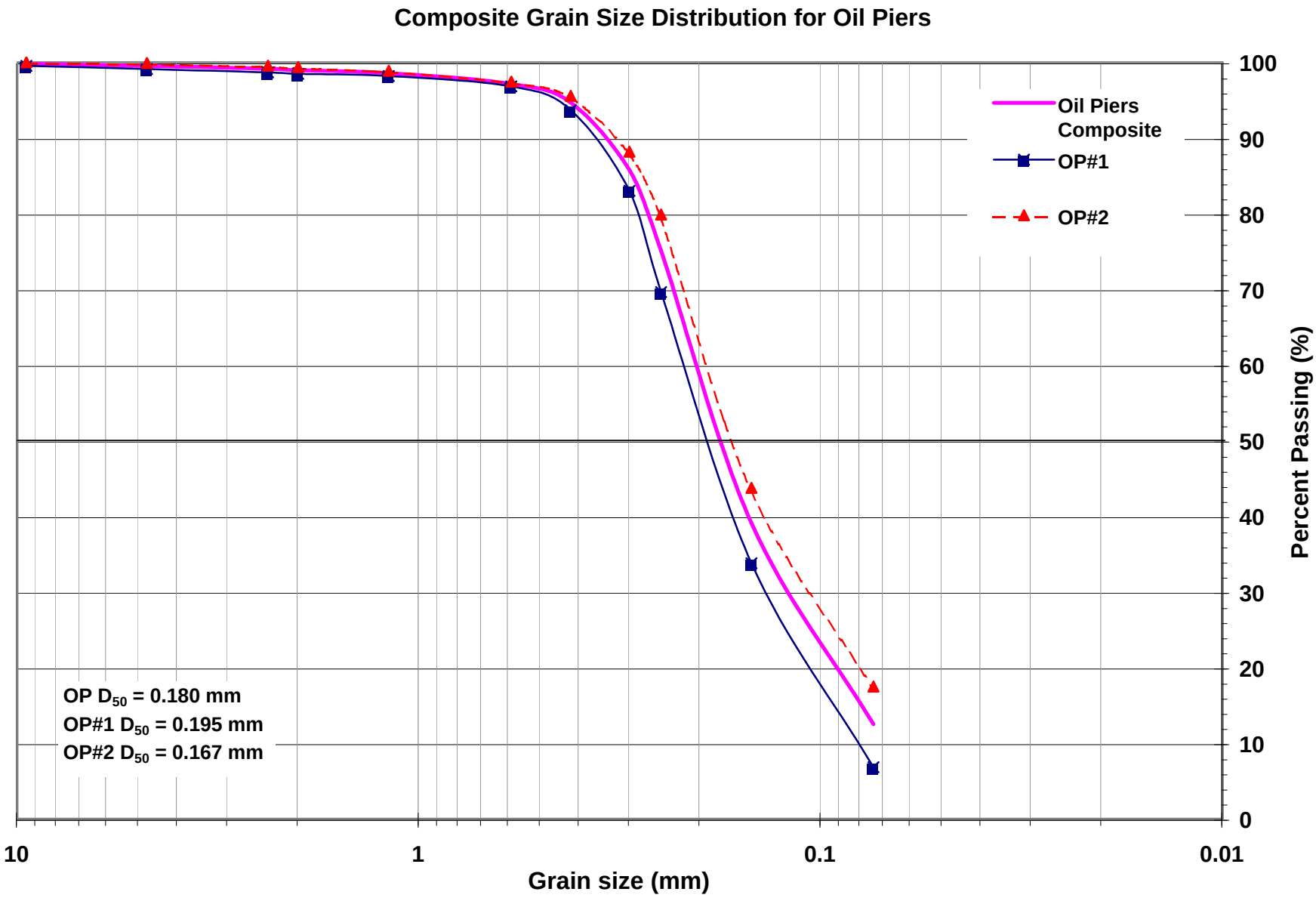
SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	Rock Revetment	100.00	100.00	98.10	100.00	100.00	98.50	100.00	99.51
SIEVE4	4.76		100.00	100.00	97.50	99.30	100.00	97.00	100.00	99.11
SIEVE8	2.38		100.00	100.00	96.20	97.90	100.00	96.60	99.90	98.66
SIEVE10	2		100.00	100.00	95.60	97.90	99.50	96.40	99.80	98.46
SIEVE16	1.19		100.00	100.00	95.00	97.60	99.10	96.20	99.30	98.17
SIEVE30	0.59		99.70	99.20	93.70	97.20	98.60	90.90	98.30	96.80
SIEVE40	0.42		99.30	98.30	92.70	95.10	96.40	79.80	94.20	93.69
SIEVE50	0.3		81.30	90.10	90.50	91.70	89.90	60.80	76.70	83.00
SIEVE60	0.25		45.50	68.90	87.30	86.80	84.20	48.70	66.00	69.63
SIEVE100	0.149		1.50	6.00	41.80	49.30	64.00	20.50	53.40	33.79
SIEVE200	0.074		0.00	0.00	1.30	2.90	8.60	1.90	33.00	6.81
84	**% (in mm)**		**0.318**	**0.286**	**0.243**	**0.242**	**0.249**	**0.484**	**0.350**	**0.311**
50	**% (in mm)**		**0.256**	**0.220**	**0.167**	**0.151**	**0.130**	**0.255**	**0.137**	**0.195**
16	**% (in mm)**		**0.182**	**0.165**	**0.101**	**0.095**	**0.084**	**0.131**	**0.036**	**0.100**

OP#2

SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE4	4.76	100.00	100.00	100.00	100.00	100.00	99.20	100.00	100.00	99.90
SIEVE8	2.38	100.00	100.00	98.90	100.00	99.40	98.10	100.00	100.00	99.55
SIEVE10	2	100.00	100.00	98.60	100.00	98.70	97.70	100.00	100.00	99.38
SIEVE16	1.19	99.80	100.00	97.90	99.70	98.10	96.10	99.90	99.60	98.89
SIEVE30	0.59	99.50	99.00	94.30	97.70	96.80	93.20	99.80	99.20	97.44
SIEVE40	0.42	99.20	97.90	88.60	95.70	94.90	89.40	99.70	99.00	95.55
SIEVE50	0.3	92.90	79.90	71.40	90.10	91.10	83.30	99.20	97.50	88.18
SIEVE60	0.25	80.70	56.10	60.00	83.60	84.80	78.80	99.00	95.90	79.86
SIEVE100	0.149	54.30	2.90	15.70	25.00	31.60	40.20	95.80	84.30	43.73
SIEVE200	0.074	44.70	0.00	0.00	0.70	1.30	1.50	69.30	22.30	17.48
84	**% (in mm)**	**0.264**	**0.327**	**0.388**	**0.253**	**0.248**	**0.314**	**0.116**	**0.149**	**0.275**
50	**% (in mm)**	**0.115**	**0.238**	**0.227**	**0.192**	**0.184**	**0.175**	**0.053**	**0.108**	**0.167**
16	**% (in mm)**	**0.026**	**0.174**	**0.150**	**0.121**	**0.110**	**0.102**	**0.017**	**0.053**	**0.070**

Oil Piers Composite

SIEVE	SIZE (mm)	Composite
		Percent Passing
SIEVE3/8"	9.5	99.77
SIEVE4	4.76	99.53
SIEVE8	2.38	99.13
SIEVE10	2	98.95
SIEVE16	1.19	98.55
SIEVE30	0.59	97.14
SIEVE40	0.42	94.68
SIEVE50	0.3	85.76
SIEVE60	0.25	75.09
SIEVE100	0.149	39.09
SIEVE200	0.074	12.50
84	**% (in mm)**	**0.292**
50	**% (in mm)**	**0.180**
16	**% (in mm)**	**0.084**


Composite Grain Size Distribution for Oil Piers
Oil Piers Composite
OP#1
OP#2
OP D50 = 0.180 mm
OP#1 D50 = 0.195 mm
OP#2 D50 = 0.167 mm
100
90
80
70
60
50
40
30
20
10
0
Percent Passing (%)
10
1
0.1
0.01
Grain size (mm)

BEACON
SURFER'S POINT - NATIVE GRAIN SIZE
JOB NO.: 4687

SP#1

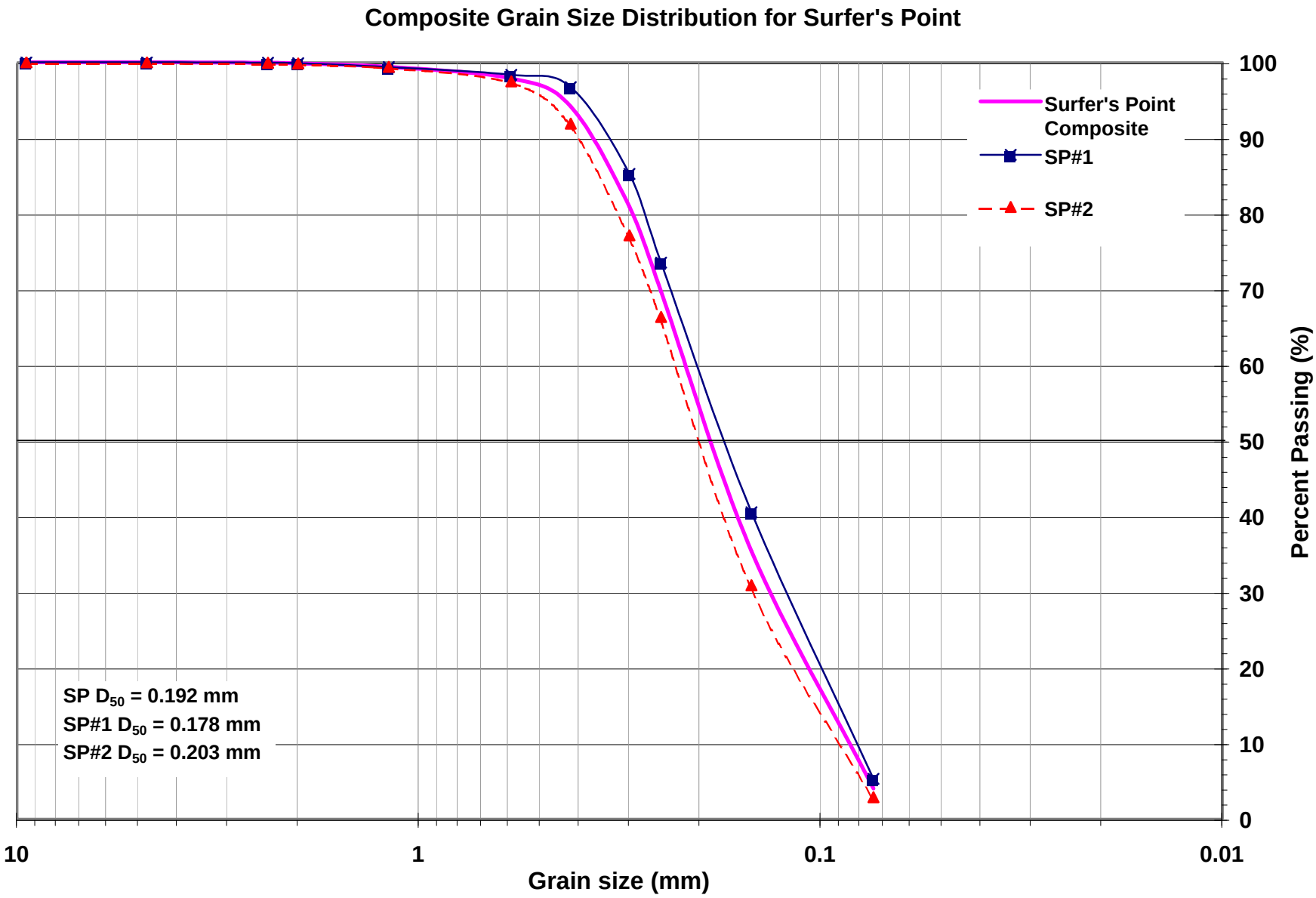
SIEVE	SIZE (mm)	Back	Sand within Cobble Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	46.70	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE4	4.76	100.00	41.10	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE8	2.38	99.90	36.80	99.90	99.90	100.00	100.00	99.90	100.00	99.94
SIEVE10	2	99.80	35.70	99.80	99.80	100.00	100.00	99.80	100.00	99.89
SIEVE16	1.19	99.70	33.10	99.70	99.70	97.20	99.60	99.70	100.00	99.37
SIEVE30	0.59	98.10	29.50	98.00	99.60	94.40	99.20	99.30	99.80	98.34
SIEVE40	0.42	90.40	27.20	93.50	98.90	98.10	97.60	99.00	99.50	96.71
SIEVE50	0.3	53.50	23.80	64.10	94.90	92.90	93.60	98.60	99.00	85.23
SIEVE60	0.25	29.30	21.80	34.60	86.20	82.10	85.60	98.30	98.50	73.51
SIEVE100	0.149	3.20	17.30	7.20	42.60	21.80	28.80	87.80	92.20	40.51
SIEVE200	0.074	0.60	12.20	0.70	1.50	0.60	4.00	12.90	16.70	5.29
84	**% (in mm)**	**0.399**	**32.667**	**0.381**	**0.245**	**0.259**	**0.247**	**0.145**	**0.141**	**0.295**
50	**% (in mm)**	**0.293**	**14.024**	**0.276**	**0.166**	**0.196**	**0.187**	**0.111**	**0.107**	**0.178**
16	**% (in mm)**	**0.199**	**0.130**	**0.181**	**0.100**	**0.128**	**0.110**	**0.077**	**0.071**	**0.097**

SP#2

SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE4	4.76	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE8	2.38	99.90	99.80	100.00	100.00	99.90	100.00	99.90	100.00	99.94
SIEVE10	2	99.80	99.60	100.00	100.00	99.70	99.80	99.70	100.00	99.83
SIEVE16	1.19	99.60	99.40	98.60	100.00	98.70	99.60	99.40	99.90	99.40
SIEVE30	0.59	98.60	94.90	97.20	99.70	93.70	98.90	97.00	99.70	97.46
SIEVE40	0.42	93.70	79.60	88.90	99.40	84.80	98.40	91.00	99.40	91.90
SIEVE50	0.3	78.20	45.20	56.80	98.30	70.90	94.30	74.30	98.90	77.11
SIEVE60	0.25	61.30	28.70	36.40	95.30	59.50	87.90	63.90	97.70	66.34
SIEVE100	0.149	4.90	1.90	2.50	38.40	21.50	53.90	38.60	85.20	30.86
SIEVE200	0.074	0.70	0.60	0.60	1.20	0.60	3.50	2.40	13.10	2.84
84	**% (in mm)**	**0.345**	**0.469**	**0.402**	**0.230**	**0.413**	**0.238**	**0.370**	**0.148**	**0.356**
50	**% (in mm)**	**0.230**	**0.317**	**0.283**	**0.170**	**0.225**	**0.143**	**0.195**	**0.112**	**0.203**
16	**% (in mm)**	**0.169**	**0.202**	**0.189**	**0.104**	**0.129**	**0.093**	**0.102**	**0.077**	**0.109**

Surfer's Point Composite

SIEVE	SIZE (mm)	Composite
		Percent Passing
SIEVE3/8"	9.5	100.00
SIEVE4	4.76	100.00
SIEVE8	2.38	99.94
SIEVE10	2	99.85
SIEVE16	1.19	99.39
SIEVE30	0.59	97.87
SIEVE40	0.42	94.15
SIEVE50	0.3	80.90
SIEVE60	0.25	69.69
SIEVE100	0.149	35.37
SIEVE200	0.074	3.98
84	**% (in mm)**	**0.328**
50	**% (in mm)**	**0.192**
16	**% (in mm)**	**0.103**


Composite Grain Size Distribution for Surfer's Point
Surfer's Point Composite
SP#1
SP#2
SP D_{50} = 0.192 mm
SP#1 D_{50} = 0.178 mm
SP#2 D_{50} = 0.203 mm
Percent Passing (%)
100
90
80
70
60
50
40
30
20
10
0
10
1
0.1
0.01
Grain size (mm)

BEACON
OXNARD SHORES - NATIVE GRAIN SIZE
JOB NO.: 4687

OS#1

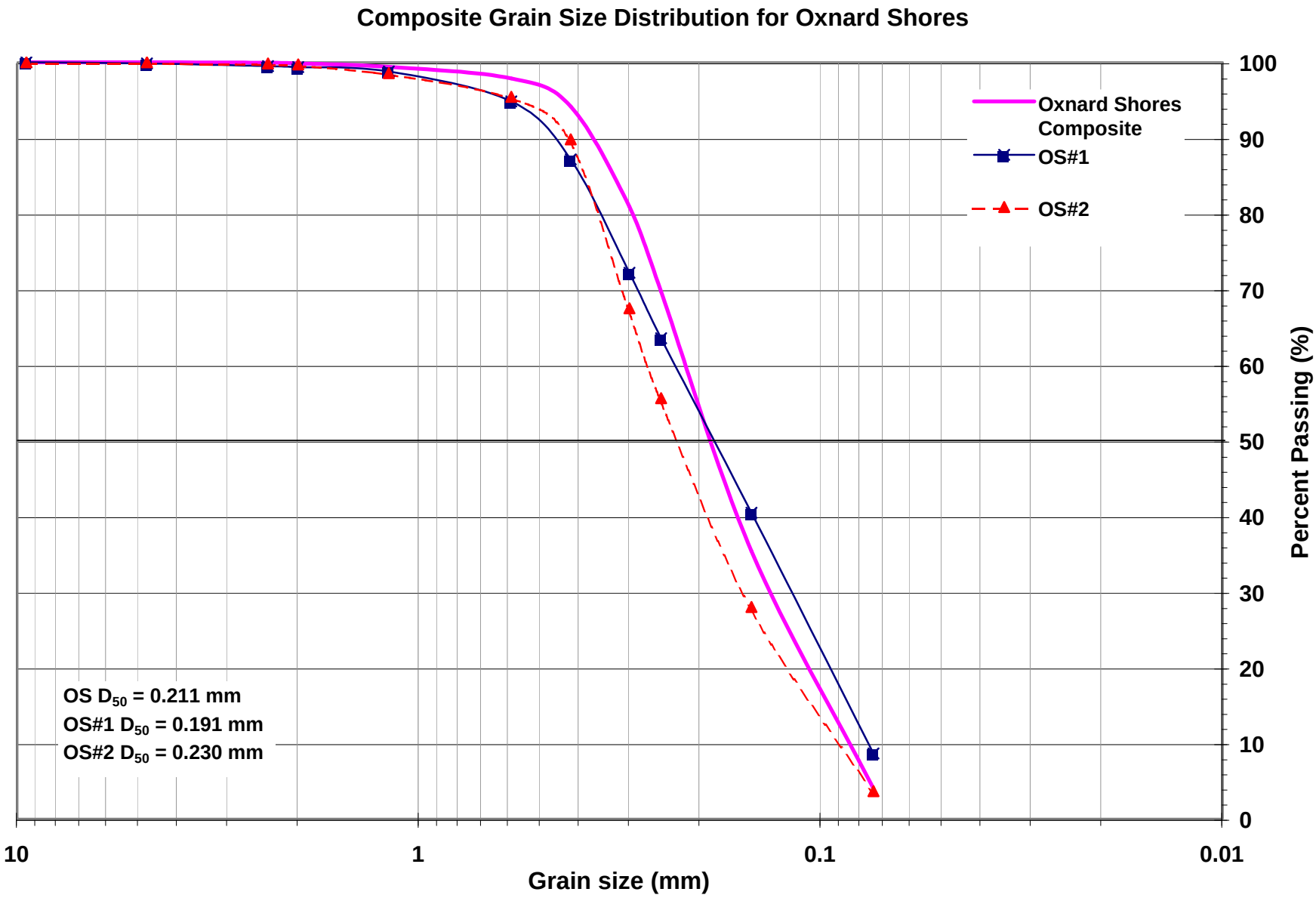
SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE4	4.76	100.00	100.00	99.30	100.00	99.40	100.00	100.00	100.00	99.84
SIEVE8	2.38	100.00	99.90	98.60	99.10	98.80	100.00	100.00	99.50	99.49
SIEVE10	2	100.00	99.80	97.90	99.10	98.80	99.80	100.00	99.50	99.36
SIEVE16	1.19	100.00	99.70	95.10	98.70	98.20	99.60	100.00	98.90	98.78
SIEVE30	0.59	98.60	90.80	77.50	97.40	97.60	99.40	99.00	98.40	94.84
SIEVE40	0.42	89.90	63.20	58.50	95.60	95.70	98.10	98.50	97.80	87.16
SIEVE50	0.3	49.60	25.00	29.60	91.20	91.80	94.90	98.00	97.30	72.18
SIEVE60	0.25	25.90	11.80	14.80	86.80	86.00	89.10	97.00	96.70	63.51
SIEVE100	0.149	1.40	1.30	1.40	45.60	43.90	48.70	88.00	93.40	40.46
SIEVE200	0.074	0.00	0.00	0.70	0.90	3.70	6.40	20.00	37.40	8.64
84	**% (in mm)**	**0.402**	**0.548**	**0.812**	**0.243**	**0.245**	**0.237**	**0.145**	**0.136**	**0.395**
50	**% (in mm)**	**0.301**	**0.379**	**0.385**	**0.160**	**0.164**	**0.152**	**0.107**	**0.091**	**0.191**
16	**% (in mm)**	**0.209**	**0.266**	**0.254**	**0.099**	**0.097**	**0.091**	**0.059**	**0.032**	**0.091**

OS#2

SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	100.00	100.00	No Sample	100.00	100.00	100.00	100.00	100.00
SIEVE4	4.76	100.00	100.00	100.00		100.00	100.00	100.00	100.00	100.00
SIEVE8	2.38	100.00	100.00	99.00		100.00	100.00	99.90	99.90	99.83
SIEVE10	2	100.00	100.00	98.60		100.00	99.80	99.80	99.80	99.71
SIEVE16	1.19	99.40	98.80	92.80		100.00	99.50	99.70	99.70	98.56
SIEVE30	0.59	98.70	97.50	75.00		99.70	99.20	98.40	99.60	95.44
SIEVE40	0.42	94.30	82.70	61.50		98.20	97.60	95.90	98.50	89.81
SIEVE50	0.3	70.30	37.00	35.10		49.10	94.30	89.60	97.00	67.49
SIEVE60	0.25	43.00	17.90	19.70		41.90	89.40	82.40	94.80	55.59
SIEVE100	0.149	3.20	1.20	1.90		37.70	42.30	35.80	73.90	28.00
SIEVE200	0.074	0.00	0.00	0.50		2.40	5.70	2.60	14.20	3.63
84	**% (in mm)**	**0.369**	**0.435**	**0.893**		**0.385**	**0.238**	**0.261**	**0.198**	**0.389**
50	**% (in mm)**	**0.263**	**0.334**	**0.368**		**0.302**	**0.166**	**0.180**	**0.119**	**0.230**
16	**% (in mm)**	**0.181**	**0.239**	**0.229**		**0.103**	**0.095**	**0.104**	**0.076**	**0.112**

Oxnard Shores Composite

SIEVE	SIZE (mm)	Composite
		Percent Passing
SIEVE3/8"	9.5	100.00
SIEVE4	4.76	99.91
SIEVE8	2.38	99.65
SIEVE10	2	99.53
SIEVE16	1.19	98.67
SIEVE30	0.59	95.12
SIEVE40	0.42	88.40
SIEVE50	0.3	69.99
SIEVE60	0.25	59.81
SIEVE100	0.149	34.65
SIEVE200	0.074	6.30
84	**% (in mm)**	**0.391**
50	**% (in mm)**	**0.211**
16	**% (in mm)**	**0.100**


Composite Grain Size Distribution for Oxnard Shores
Oxnard Shores Composite
OS#1
OS#2
OS D50 = 0.211 mm
OS#1 D50 = 0.191 mm
OS#2 D50 = 0.230 mm
Percent Passing (%)
100
90
80
70
60
50
40
30
20
10
0
10
1
0.1
0.01
Grain size (mm)

BEACON
HUENEME BEACH - NATIVE GRAIN SIZE
JOB NO.: 4687

HB#1

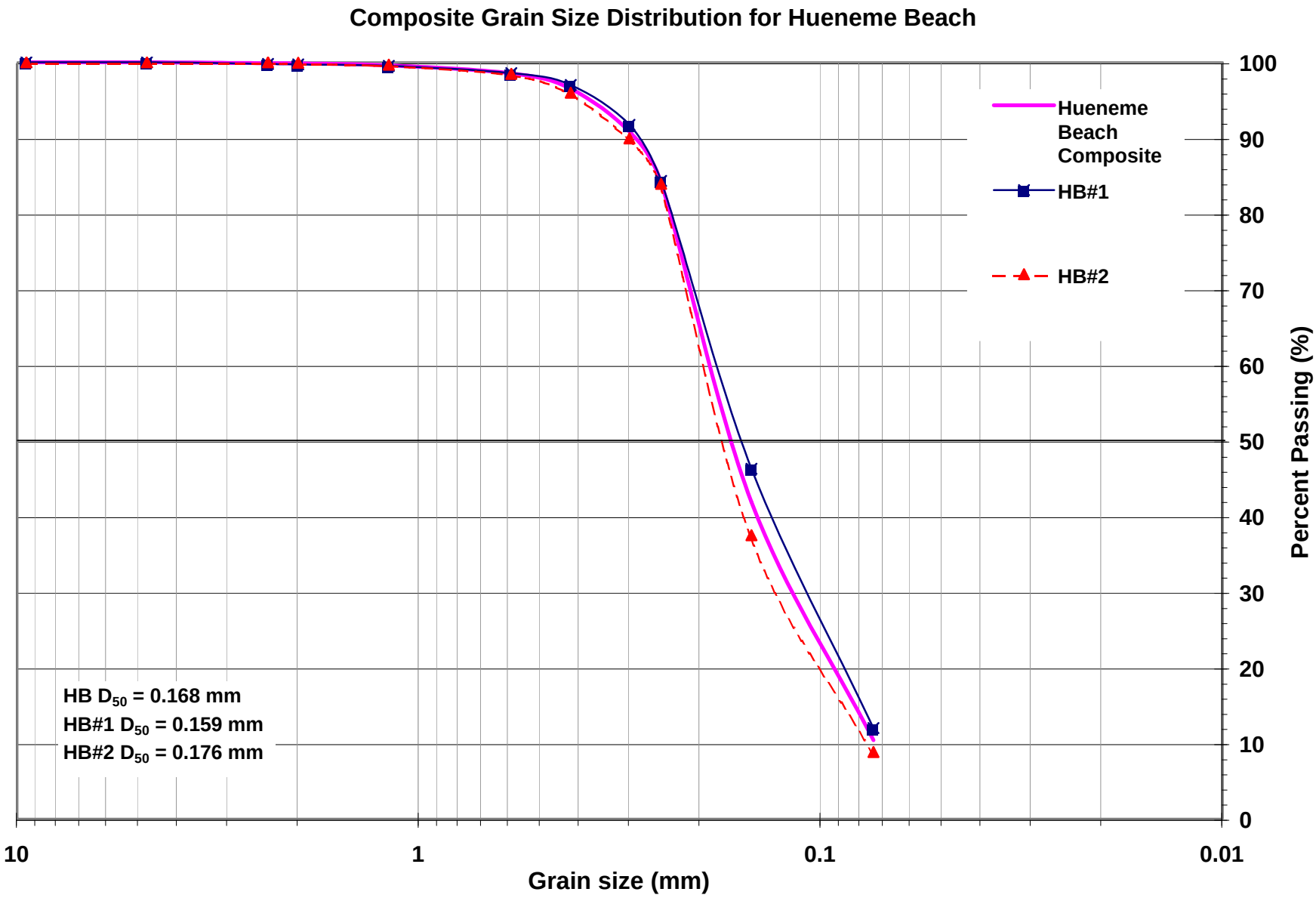
SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE4	4.76	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE8	2.38	98.50	100.00	100.00	99.90	99.90	100.00	100.00	100.00	99.79
SIEVE10	2	98.20	100.00	100.00	99.80	99.80	100.00	100.00	100.00	99.73
SIEVE16	1.19	97.10	100.00	100.00	99.70	99.70	99.70	100.00	99.90	99.51
SIEVE30	0.59	94.70	99.70	99.40	98.00	97.90	99.40	99.80	99.70	98.58
SIEVE40	0.42	89.50	99.00	98.70	95.40	95.80	99.00	99.50	99.00	96.99
SIEVE50	0.3	69.00	96.10	94.20	88.70	91.60	98.40	98.00	97.90	91.74
SIEVE60	0.25	50.30	89.70	83.30	76.80	84.60	97.40	96.50	95.80	84.30
SIEVE100	0.149	12.90	16.10	13.50	21.90	35.70	90.40	89.90	89.60	46.25
SIEVE200	0.074	1.20	0.60	0.60	2.00	2.10	17.30	30.30	41.70	11.98
84	**% (in mm)**	**0.388**	**0.205**	**0.253**	**0.280**	**0.249**	**0.142**	**0.142**	**0.140**	**0.249**
50	**% (in mm)**	**0.249**	**0.196**	**0.202**	**0.201**	**0.179**	**0.108**	**0.099**	**0.087**	**0.159**
16	**% (in mm)**	**0.157**	**0.149**	**0.153**	**0.127**	**0.105**	**0.068**	**0.039**	**0.034**	**0.083**

HB#2

SIEVE	SIZE (mm)	Back	Berm	0 ft	-6 ft	-12 ft	-18 ft	-24 ft	-30 ft	Composite
		Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing	Percent Passing
SIEVE3/8"	9.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE4	4.76	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
SIEVE8	2.38	99.90	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.99
SIEVE10	2	99.80	100.00	99.70	100.00	100.00	100.00	100.00	100.00	99.94
SIEVE16	1.19	99.70	99.70	99.40	99.00	100.00	99.90	99.80	99.90	99.68
SIEVE30	0.59	98.20	96.10	96.90	98.00	99.70	99.60	99.60	99.60	98.46
SIEVE40	0.42	96.00	88.90	93.10	93.30	98.80	99.30	99.20	99.30	95.99
SIEVE50	0.3	90.90	72.50	83.00	80.70	97.60	98.60	97.70	98.60	89.95
SIEVE60	0.25	83.50	67.50	67.90	66.70	95.70	97.10	95.50	97.50	83.93
SIEVE100	0.149	33.50	11.80	10.10	14.70	58.50	85.70	37.60	47.90	37.48
SIEVE200	0.074	6.70	0.70	0.00	0.70	7.30	52.90	0.80	1.40	8.81
84	**% (in mm)**	**0.253**	**0.384**	**0.312**	**0.331**	**0.218**	**0.145**	**0.230**	**0.223**	**0.251**
50	**% (in mm)**	**0.182**	**0.218**	**0.219**	**0.218**	**0.137**	**0.070**	**0.171**	**0.153**	**0.176**
16	**% (in mm)**	**0.100**	**0.157**	**0.159**	**0.156**	**0.087**	**0.022**	**0.105**	**0.098**	**0.093**

Hueneme Beach Composite

SIEVE	SIZE (mm)	Composite
		Percent Passing
SIEVE3/8"	9.5	100.00
SIEVE4	4.76	100.00
SIEVE8	2.38	99.89
SIEVE10	2	99.83
SIEVE16	1.19	99.59
SIEVE30	0.59	98.52
SIEVE40	0.42	96.49
SIEVE50	0.3	90.84
SIEVE60	0.25	84.11
SIEVE100	0.149	41.86
SIEVE200	0.074	10.39
84	**% (in mm)**	**0.250**
50	**% (in mm)**	**0.168**
16	**% (in mm)**	**0.087**


Composite Grain Size Distribution for Hueneme Beach
Hueneme Beach Composite
HB#1
HB#2
HB D50 = 0.168 mm
HB#1 D50 = 0.159 mm
HB#2 D50 = 0.176 mm
Percent Passing (%)
100
90
80
70
60
50
40
30
20
10
0
10
1
0.1
0.01
Grain size (mm)

APPENDIX B
CHAMBERS GROUP, INC
BIOLOGICAL REPORT

BEACON
SOUTH CENTRAL COAST
BEACH ENHANCEMENT PROGRAM
BIOLOGICAL RESOURCES REPORT

Prepared for:

BEACON
105 East Anapamu, Room 201
Santa Barbara, California 93101

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Irvine, California 92614
(949) 261-5414

February 2001

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SECTION 1.0 - INTRODUCTION

1.1 BACKGROUND

Santa Barbara and Ventura County beaches have been eroding for many years because sand mining, dams, and debris basins have cut off the natural supply of sand to the coast. This ongoing beach erosion destroys marine habitat, reduces recreational beach space and threatens coastal property and structures. The proposed project is to establish a beach enhancement program for south central coast beaches by developing procedures and obtaining permits to allow beach-compatible sediments that may be available from debris basins, landslides, dams, wetlands, rivers, and lagoon mouths to be used for routine beach nourishment purposes. Frequently, opportunities arise to nourish local beaches with sediments from construction projects such as debris basin cleanouts, landslide cleanups, construction grading, and dam decommissionings. However, most opportunities are lost because regulatory permits for coastal sediment disposal may take many months to receive approval.

BEACON is a joint-powers agency consisting of the Counties of Ventura and Santa Barbara and the Cities of Santa Barbara, Carpinteria, San BuenaVentura, Oxnard and Port Hueneme. BEACON proposes to establish a long-term beach enhancement program so that sediment from opportunistic sources can be used to nourish eroded beaches. Protocols will be established to prevent adverse environmental impacts to designated receiver beaches, and criteria will be developed to determine that sediment is compatible with receiver beaches. Once sand has been placed on a receiver site, waves will move it down coast, benefiting all beaches east of the receiver site.

This report describes the biological resources in the BEACON project area and analyzes the potential effects of the proposed project on those resources. Section 1.2 below briefly describes the proposed project. Section 2.0 describes the existing biological resources. Section 3.0 analyzes the impacts of BEACON's proposed beach enhancement program. Section 4.0 summarizes monitoring, habitat protection, and mitigation.

1.2 PROPOSED PROJECT

BEACON proposes to implement a program to pursue opportunities for obtaining suitable beach sand for placement at selected beach sites for erosion control and recreational benefits. The six beach enhancement sites are Goleta Beach and Ash Avenue in Santa Barbara County and Oil Piers, Surfer's Point, Oxnard Shores and Hueneme Beach in Ventura County (Figure 1-1 and 1-2).

The program is designed to capitalize on opportunities to obtain beach-quality sand from flood control debris basins, landslides, construction projects, dam removal activities, wetlands restoration and harbor dredging when it becomes available. The objective is to streamline the permit process for implementing beach-fill projects for the overall purposes of:

Figure 1-1

Figure 1-2

1. Renourishing the Santa Barbara Littoral Cell; and
2. Improving protection to coastal structures and enhancing recreational opportunities.

The primary objective of the program is to obtain a 5-year permit from all necessary regulatory agencies to allow opportunistic beach enhancement projects to occur within the 5 years, eliminating the need for separate permits for each project. The permitting agencies include the U.S. Army Corps of Engineers (USACE), California Coastal Commission (CCC), California Regional Water Quality Control Board (RWQCB), State Lands Commission (SLC), and the County of Santa Barbara. In addition permits may be required from the individual cities. The permits would allow beach fills to occur based on a pre-determined set of criteria that each project would have to meet. The criteria would include chemical characteristics of the sand, grain size, color, particle shape, debris content, compactability/moldability, placement sites, placement timing, and placement rates.

Table 1-1 summarizes the sand quantities and percent fines proposed for placement on each receiver beach. Table 1-2 summarizes anticipated sand sources, transport method(s), and potential sand volume for each beach receiver site. In most cases sand will be transported from the source to the receiver beach by truck. The beach fill material will be placed below the mean high tide line, as a layer over the beach surface as a berm, as a sand dike along the back of the beach, or as dune placement and stabilization.

Table 1-1
Proposed Limitations of Sand Placement Quantities

Placement Site	Percent Fines Allowed [1]	Maximum Quantities (Cy) Per Season Per Year		Maximum Annual Total Quantity
		Fall/ Winter	Spring/ Summer	
Goleta Beach	25%	100,000	0	100,000
Ash Avenue	25%	100,000	0	100,000
Oil Piers	35%	183,300	91,700	275,000
Surfer's Point	35%	116,700	58,300	175,000
Oxnard Shores	35%	250,000	0	250,000
Hueneme Beach	35%	250,000	0	250,000

[1] 25% fines content is proposed at Goleta Beach and at Ash Avenue because of the existing reefs located near the project sites. All other sites propose 35% fines, since limited offshore resources exist at these sites.

Table 1-2
Potential Sand Sources and Estimated Volumes

Receiver Site	Potential Sand Sources	Transport Method	Volume (cubic yards)	Footnote
Goleta Beach	Flood Control Debris Basins	Truck	125,000	1
	Goleta Slough	Dredge	25,000-200,000	2
	Caltrans Landslide Material	Truck	10,000-100,000	3
	Miscellaneous Upland Construction	Truck	Unknown	
Ash Avenue	Flood Control Debris Basins	Truck	125,000	1
	Carpinteria Marsh	Dredge/Truck Conveyor	10,000-40,000	2
	Caltrans Landslide Material	Truck	10,000-100,000	3
	Miscellaneous Upland Construction	Truck	Unknown	
Oil Piers	Flood Control Debris Basins	Truck/Conveyor	225,000	1
	Caltrans Landslide Material	Truck/Conveyor	200,00-250,000	3
	Miscellaneous Upland Construction	Truck/Conveyor	Unknown	
Surfer's Point	Flood Control Debris Basins	Truck	225,000	1
	Matilija Dam Decommissioning	Truck	Up to 6,000,000	4
	Ventura River	Truck	Unknown	
	Miscellaneous Upland Construction	Truck	Unknown	
Oxnard Shores	Flood Control Debris Basins	Truck	225,000	1
	Santa Clara River	Truck/Conveyor	Unknown	
	Callegus Creek	Truck	300,000	5
	Miscellaneous Upland Construction	Truck	Unknown	
Hueneme Beach	Flood Control Debris Basins	Truck	225,000	1
	Port Construction Activities	Truck/Conveyor	Unknown	
	Mugu Lagoon	Truck	Unknown	
	Ormond Slough	Dredge/Truck	Unknown	
	Callegus Creek	Truck	300,000	5
	Caltrans Landslide Material	Truck	200,000-250,000	3
	Miscellaneous Upland Construction	Truck	Unknown	

1. Debris basin capacity in each respective county, multiplied by 20 percent (the percent of material, believed to be of beach quality).
2. Historic dredge volume, project every three to four years.
3. Average yearly volume.
4. Estimated total volume (one-time volume).
5. Average volume removed from Callegus creek every four to five years.

SECTION 2.0 - EXISTING CONDITIONS

2.1 REGIONAL OVERVIEW

The BEACON project area, which encompasses the nearshore region between Coal Oil Point and Point Mugu, lies at the southeastern end of the Santa Barbara Channel. The Santa Barbara Channel is bordered on its seaward margin by the northern Channel Islands: Anacapa, Santa Cruz, Santa Rosa, and San Miguel. These islands shelter the mainland coast from the direct force of incoming south swell. Point Conception at the western end of the Santa Barbara Channel and the east-west orientation of the coast provide additional protection from northwest swells. The southeastern Santa Barbara coast, thus, comprises a relatively protected and benign environment for marine life. Between Ventura and Point Mugu, the coast turns to a north-south direction and is exposed to winter storms from the Gulf of Alaska. The Ventura County portion of the BEACON project area is thus less protected from ocean swell than the Santa Barbara County portion.

The Santa Barbara Channel lies along important migration routes for marine mammals, fishes and seabirds and also contains a diverse assemblage of resident marine life. Marine habitats within the coastal region at the eastern end of the Santa Barbara Channel include offshore sand bottoms and rocky reefs, kelp forests, and sandy, rocky and cobble beaches. Several mud bottom estuaries and salt marshes are also found along this section of coast.

Section 2.2 of this existing conditions section discusses sensitive marine species found in the BEACON project area. Section 2.3 describes the biological resources at each of the six beach placement sites.

2.2 SENSITIVE SPECIES

Table 2-1 lists sensitive coastal species that occur in the BEACON project area. Each species is discussed briefly below. The occurrence of sensitive species at each of the six placement sites is discussed in more detail in Section 2.3.

2.2.1 Listed Species

Salt Marsh Bird's Beak *(Cordylanthus maritimus* ssp. *maritimus)* - Federal Endangered, State Endangered. This annual plant is found in the upper or high salt marsh where it is a hemiparasite, attaching its roots to neighboring marsh perennials. The salt marsh bird's beak has become endangered primarily through the loss of its salt marsh habitat. Carpinteria salt marsh is the northwestern limit of occurrence for salt marsh bird's beak. It is also found just east of the BEACON project area in Mugu Lagoon. It would not be expected on the beaches targeted for sand placement.

Table 2-1
Sensitive Species in BEACON Project Area

SCIENTIFIC NAME	Common Name	Status	PFO	Comments
PLANTS				
Cordylanthus maritimus ssp. *maritimus*	salt marsh bird's beak	FE,SE	L	Found in Carpinteria Marsh, would not be expected in beach areas.
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	FSOC	L	Found in Goleta Slough and Carpinteria Marsh, would not be expected in beach areas.
ANIMALS				
CLASS OSTEICHTHYES	**BONY FISH**			
Salmonidae	**Trouts, Salmons, Chars, and Whitefishes**			
Oncorhynchus mykiss	southern steelhead	FE, CSC	H	Spawns in coastal streams in the BEACON project area.
Gobiidae	**Gobies**			
Eucyclogobius newberryi	tidewater goby	FE*,CSC	L	Found in brackish water in river mouths; in project area found in Carpinteria Creek, Ventura River, Oxnard Drain, and Santa Clara River, suitable habitat not present in open ocean.
CLASS AVES	**BIRDS**			
Gaviidae	**Loons**			
Gavia immer	common loon	CSC	H	Common in Santa Barbara and Ventura coastal waters.
Pelecanidae	**Pelicans**			
Pelecanus occidentalis californicus	California brown pelican	FE,SE	H	Breeds on Anacapa and Santa Barbara Islands, common along coast.
Phalacrocoracidae	**Cormorants**			
Phalacrocorax auritus	double-crested cormorant	CSC	H	Nests on northern Channel Islands, common along coast.
Falconidae	**Falcons**			
Falco peregrinus	peregrine falcon	SE	M	Nests on northern Channel Islands, observed occasionally along coast in BEACON project area.
Rallidae	**Rails, Coots, and Gallinules**			
Rallus longirostris levipes	light-footed clapper rail	FE,SE	L	Carpinteria Marsh is northernmost breeding area, does not occur on open coast.
Charadriidae	**Plovers**			
Charadrius alexandrinus nivosus	western snowy plover	FT,CSC	H	Nests and forages in BEACON project area, several stretches of coast in the area designated as Critical Habitat, nests near Oxnard Shores and Hueneme Beach.

SCIENTIFIC NAME	Common Name	Status	PFO	Comments
Scolopacidae	**Sandpipers**			
Numenius americanus	long-billed curlew	CSC	M	Fairly common migrant and winter visitor in mudflat habitats but also sometimes occurs along sandy beaches.
Laridae	**Gulls and Terns**			
Larus californicus	California gull	CSC	H	Common transient and winter visitor along coast.
Sterna elegans	elegant tern	FSOC,CSC	H	Common summer and fall visitor.
Sterna antillarum browni	California least tern	SE,FE	H	Nests near Santa Clara River and at Ormond Beach.
Emberizidae	**Sparrows, Buntings, and Warblers**			
Passerculus sandwichensis beldingi	Belding's savannah sparrow	FSOC,SE	M	Nests in coastal saltmarshes including Carpinteria Marsh, Goleta Slough and Ormond Beach, might occasionally forage in upper portions of sandy beaches in project area.
CLASS MAMMALIA	**MAMMALS**			
Mustelidae	**Weasels and relatives**			
Enhydra lutris nereis	Southern sea otter	FT	L	Most of population north of Pt. Conception, a few animals south of Pt. Conception, only occasional occurrences expected in BEACON project region.

*** = Proposed for delisting north of Orange County.**
FT = Listed as a threatened species by the federal government.
FE = Listed as an endangered species by the federal government.
FSOC = Federal Species of Concern.
SE = Listed as an endangered species by the State of California.
CSC = California Species of Special Concern.
PFO = Potential to occur.
L = Low potential to occur within beach and nearshore habitats of BEACON area.
M = Moderate potential to occur within beach and nearshore habitats of BEACON area.
H = High potential to occur within beach and nearshore habitats of BEACON area.

Southern Steelhead (*Oncorhynchus mykiss*) - Federal Endangered, California Species of Special Concern. The Southern California Evolutionarily Significant Unit of the steelhead (*Oncorhynchus mykiss*) was listed as endangered by the federal government in October of 1997. Steelhead are the ocean-going form of rainbow trout. They spend their adult lives in the ocean and then return to coastal streams to spawn. Fish movements both upstream and downstream coincide with flow pulses from storms. These coastal streams are often characterized by sand bar buildup at their mouths during low flow months. Steelhead occur at times in many of the coastal streams in Santa Barbara and Ventura Counties and would be expected in low numbers in nearshore waters off the BEACON area beaches.

Tidewater Goby (*Eucyclogobius newberryi*) - Federal Endangered (proposed for delisting north of Orange County), California Species of Special Concern. The tidewater goby is found in brackish water habitats along the California coast from Agua Hediona Lagoon in San Diego County to the mouth of the Smith River near the California/Oregon border. This fish occurs in shallow lagoons and lower stream reaches. Within the BEACON project area, tidewater gobies have been recorded in recent years in Carpinteria Creek, the Ventura River, the Oxnard Drain and the Santa Clara River (CDFG 2000). Tidewater gobies would not be expected in the ocean waters off BEACON project area beaches. In 1999, the U.S. Fish and Wildlife Service proposed delisting tidewater goby populations north of Orange County.

California Brown Pelican (*Pelecanus occidentalis californicus*) - Federal Endangered, State Endangered. The California brown pelican was listed as endangered by both the federal and state governments following several years of pollutant-related reproductive failures. The breeding colonies on Anacapa and Santa Barbara Islands have since recovered to their former numbers. In 1997, approximately 6,200 pairs of brown pelicans nested on the Channel Islands. Much higher numbers nest off Baja California, primarily in the Gulf of California. Brown pelicans are relatively common year-round in the nearshore waters of Santa Barbara and Ventura Counties. Their numbers are generally lower during the late winter and spring when most birds are at their nesting sites. Peak abundance occurs July through December when migrants from Mexico are present. Brown pelicans feed primarily on near-surface schooling fish, particularly northern anchovy. They locate prey while flying and then plunge from the air to capture the prey underwater.

Peregrine Falcon (*Falco peregrinus*) - State Endangered. The peregrine falcon was listed as endangered because of reproductive failures linked to chemical pollutants, especially DDT. The population has recovered, and the federal government delisted it in 1999. Peregrine falcons currently breed on all of the northern Channel Islands, but not on the mainland coast within the BEACON project area. Migrants are seen occasionally in the BEACON project area. Peregrine falcons feed almost exclusively on birds.

Light-footed Clapper Rail (*Rallus longirostris levipes*) - Federal Endangered, State Endangered. The light-footed clapper rail is a secretive bird of southern California salt marshes. It nests predominantly in the cordgrass vegetation of the low salt marsh. Carpinteria Marsh is currently the northern extent of the light-footed clapper rail's range.

In 1995 two pair were recorded in Carpinteria Marsh (CDFG 2000). Light-footed clapper rails rarely venture far from marsh vegetation and would not be expected on the beaches in the BEACON project area.

Western Snowy Plover (*Charadrius alexandrius nivosus*) - Federal Threatened, California Species of Special Concern. This small shorebird nests on large expansive sand areas and forages for invertebrates on sand flats, sandy intertidal beaches, or intertidal mudflats. Within the BEACON project area snowy plovers nest at McGrath State Beach, Mandalay Beach, Channel Islands Harbor, and Ormand Beach between March and September (M. Whetje, CDFG, personal communication 2000). During the winter, they disperse from their nesting sites and forage on beaches throughout the BEACON project area. The U.S. Fish and Wildlife Service has designated several beaches within the BEACON project area as Critical Habitat for the western snowy plover (Miller 1999). These beaches are Devereaux Beach, Point Castillo/Santa Barbara Harbor Beach, Carpinteria Beach, San BuenaVentura Beach, Mandalay Beach/Santa Clara River Mouth, Ormond Beach, and Mugu Lagoon Beach.

California Least Tern (*Sterna antillarum browni*) - Federal Endangered, State Endangered. Least terns nest on sandy beaches and prefer to forage in quiet bays and lagoons although they also feed off the open coast. This species has become endangered primarily because of human disturbance to its sandy beach nesting habitat. Least terns are present in southern California during the breeding season between April and September. They winter in South America. In the BEACON project area, least terns breed at the Santa Clara River mouth and Ormond Beach. There is a major least tern breeding colony at Point Mugu.

Belding's Savannah Sparrow (*Paserculus sandwichensis beldingi*) - State Endangered, Federal Species of Concern. This race is one of the four described forms of the widespread savannah sparrow that inhabit a wide variety of grass and marsh habitats throughout north and central America. Belding's is darker in plumage than the other races and is restricted to salt marsh habitats where it breeds in pickleweed. Within the BEACON project area, Belding's savannah sparrow breeds at Goleta Slough, Carpinteria Marsh, McGrath Beach and Ormond Beach (CDFG 2000). Mugu Lagoon, just east of the BEACON project area, supports a large breeding population.

Southern Sea Otter (*Enhydra lutris nereis*) - Federal Threatened. The southern sea otter ranges along the central California coast from Pigeon Point near Santa Cruz in San Mateo County south to Purisma Point north of Point Conception in Santa Barbara County. The population has recovered from near extinction from fur traders, but still remains vulnerable because of its restricted range. The 2000 census of the population was 2,317 otters.(Walden-Schertz 2000). In 1987, the U.S. Fish and Wildlife Service started a program to transplant otters to San Nicolas Island. By the end of the translocation effort in 1990, more than 139 southern sea otters and one rehabilitated pup had been moved to San Nicolas Island (USFWS 1999). The translocation effort has been a failure. In 1998 only 15 sea otters were counted on the island. Wanderers from the southern sea otter's established range have been reported from Cape Mendocino in northern California to Point Loma near San Diego. In February 1999, 152 otters were counted south of Point Conception (Scherz 2000). It is expected that

southern sea otters might occasionally occur in nearshore waters in the BEACON project area but they are not common.

2.2.2 Federal Species of Concern and California Species of Special Concern

Federal Species of Concern and California Species of Special Concern have no legal protection but are species considered to be in danger of declining.

Coulter's Goldfields (*Lasthenia glabrata* ssp. *coulteri*) - Federal Species of Concern. Coulter's goldfield is an annual plant that is usually found on akaline soils in playas, sinks, and grasslands as well as in coastal salt marshes. It has been reported in Goleta Slough and Carpinteria Marsh but would not be expected on the beaches in the BEACON project area.

Common Loon (*Gavia immer)* - California Species of Special Concern. Loons are diving, fish-eating birds that forage primarily in relatively deep but protected waters of nearshore coastal waters, bays, and estuaries. They are a common transient and winter visitor along the Santa Barbara and Ventura County coast and are rare but regular there in summer.

Double-crested Cormorant (*Phalacrocorax auritus*) - California Species of Special Concern. Double-crested cormorants nest on the Channel Islands and are a common transient and winter visitor along the Santa Barbara and Ventura County coast. They are especially abundant between Goleta and Carpinteria (Lehman 1994). Like the California brown pelican population, the southern California double-crested cormorant population has recovered from the reproductive effects of DDT.

Long-billed Curlew (*Numenius americanus*) - California Species of Special Concern. Long-billed curlews are a shorebird that breeds in the north and winters in southern California. It is most common in sheltered mudflats but also occasionally forages along sandy beaches.

California Gull (*Larus californicus)* - California Species of Special Concern. Concern for this species is based primarily on impacts to the Mono Lake nesting colony, the main contributor to California's population. During migration and winter, the California gull may be the most common gull in the Santa Barbara Channel (Lehman 1994). They frequent all major bodies of water including the open ocean, harbors, sloughs, river mouths, lagoons, lakes, ponds, and flooded fields.

Elegant Tern (*Sterna elegans*) - Federal Species of Concern, Californa Species of Special Concern. Elegant terns nest south of the BEACON project area in the Port of Los Angeles, the Bolsa Chica wetlands, and San Diego Bay. In Santa Barbara and Ventura Counties elegant terns are a common summer and fall visitor. They frequent nearshore waters and beaches, harbors, sloughs, and river mouths along the immediate coast.

2.3 BIOLOGICAL RESOURCES AT EACH SITE

2.3.1 Methodology

Assessment of the biological resources at each of the six beach placement sites was done by site visits, underwater surveys, contacts with agency personnel and other individuals familiar with biological resources at the sites, and review of the literature including the Department of Fish and Game Natural Diversity Data Base (CDFG 2000).

All of the beach placement sites were visited on August 24, 2000, by Dr. Noel Davis of Chambers Group, and Ms. Lori Dalessio and Mr. Chris Webb of Moffatt & Nichol. During these site visits, the presence of sensitive resources such as significant rocky intertidal habitat and kelp beds was noted.

On September 19 and 20, 2000, the Goleta Beach, Ash Avenue, Oil Piers and Surfer's Point sites were surveyed for kelp and subtidal rocky habitat by SCUBA diving. The Oxnard Shores and Hueneme Beach sites were not dived because they occur along a long stretch of sandy shore with no hard bottom habitat. The biologist divers were Dr. Davis and Mr. Todd Chapman of Chambers Group. The survey vessel was the 24-foot Skipjack, *Osprey*, captained by Mr. Paul Aines. The vessel was equipped with a profiling fathometer and a Geographical Positioning System (GPS). Weather conditions during the survey consisted of calm seas with light winds and about 2-foot surf and swell. At each of the four sites, the boat traversed the nearshore area. The locations of all kelp surface canopy that was observed and all kelp plants or subtidal relief that appeared on the fathometer were recorded. At each site, Dr. Davis and Mr. Chapman swam underwater parallel to shore for the entire length of the beach placement area. The water depth of the underwater survey varied from site to site depending on the swell conditions, but was between 5- and 15-foot depth Mean Lower Low Water (MLLW). During the underwater surveys, the nature of the bottom and the presence of kelp, eelgrass or surfgrass was noted.

Because literature review and personal contacts indicated that significant rocky intertidal occurs near the Ash Avenue and Oil Piers sites, on December 12, 2000, Dr. Davis visited these sites during a spring low tide (-1.4 feet [ft.] MLLW) to observe the intertidal habitat.

Table 2-2 summarizes significant biological resources in the vicinity of each of the proposed beach placement sites.

2.3.2 Goleta Beach

2.3.2.1 Intertidal

Figure 2-1 shows biological resources in the vicinity of the Goleta Beach site. Intertidal habitat at the Goleta Beach site is sandy. Rocky intertidal habitat occurs approximately 1,500 ft. upcoast. This rocky intertidal habitat is characterized by large rock benches

Table 2-2
Biological Information for Beach Fill Sites

Alternative Beach Fill Sites						
	Goleta	**Ash Avenue**	**Oil Piers**	**Surfer's Point**	**Oxnard Shores**	**Hueneme Beach**
Intertidal Substrate	Sand	Sand/cobble at down coast end	Sand/cobble upcoast	Boulder/ cobble	Sand	Sand
Longshore Distance to Closest Significant Rocky Intertidal	1,500 ft. upcoast	1,500 ft. down coast	1,200 ft. upcoast	26,000 ft. upcoast	40,000 ft downcoast	24,000 ft. downcoast
Nearshore Subtidal Substrate	Scattered rocks 1 to 3 ft. high	Sand/cobble at downcoast end	Scattered rocks at upcoast end -4 to 12 inches high	Boulders/ cobble - rocks between 3 inches and 2 ft. high	Sand	Sand
Distance to Kelp Beds/Reefs	1,700 ft. down coast, kelp on outfall pipe 700 ft. offshore	600 ft. offshore of upcoast end	1,000 ft. offshore of downcoast end	19,000 ft. upcoast	62,000 ft.	65,000 ft.
Distance to Wetlands Inlet	500 ft. downcoast	1,300 ft. upcoast	35,000 ft. upcoast	700 ft. upcoast	10,000 ft. upcoast	36,000 ft. upcoast and downcoast
Offshore Distance to Eelgrass	Potentially about 1,500 ft.	None in area	None in area	None in area	None in area	None in area
Distance to Least Tern Colony	Over 35 miles	About 17 miles	About 13 miles	About 3.5 miles	Less than 500 ft.	Approximately 2,500 ft. downcoast
Snowy Plover Critical Habitat	Wintering habitat 12,000 ft. upcoast	Winter habitat downcoast	Wintering habitat 25,000 ft. upcoast	Winter habitat 500 ft. downcoast	Nesting and winter habitat along upper beach	Nesting and winter habitat along downcoast end of beach

GOLETA SLOUGH

GOLETA SLOUGH - SENSITIVE HABITAT

2200'

PACIFIC OCEAN

GB #1

GB #2

PACIFIC OCEAN

ENVIRONMENTALLY SENSITIVE HABITAT (ESH) SUBTIDAL AND INTERTIDAL AT GOLETA POINT

OUTFALL PIPE WITH KELP AND REEF ORGANISMS

N

Scale 1"=500'

250 0 250 500

LEGEND:

= HISTORIC KELP BEDS

= ROCKY INTERTIDAL

= POTENTIAL EELGRASS AREAS

= WIDELY SCATTERED ROCKS

GB #X — SEDIMENT SAMPLE TRANSECT

= PROPOSED BEACH FILL

Chambers Group

Source:
MOFFATT & NICHOL ENGINEERS
DECEMBER 2000

BIOLOGICAL RESOURCES AT GOLETA BEACH
Figure 2-1

and boulders (Tway 1991). Characteristic species include California mussels (*Mytilus californianus*), green sea anemones (*Anthopleura elegantissima*), and feather boa kelp (*Egregia menziesii).* The rocky intertidal habitat off Goleta Point has been designated an Environmentally Sensitive Habitat (ESH) in the Santa Barbara County Local Coastal Plan (1982).

2.3.2.2 Subtidal

The subtidal habitat in shallow water (7 to 15 ft.) off Goleta Beach consists primarily of sand with a few scattered rocks that are between 1 and 3 ft. high. Some of these rocks support feather boa kelp and giant kelp (*Macrocystis pyrifera*).

The Goleta Sanitary District outfall line runs from the shore to about 93 ft. water depth west of Goleta Pier, just offshore the eastern end of the proposed Goleta Beach sand placement area. The outfall line emerges from the sand at a water depth of 8 ft. From about 11-foot depth to its end, the pipeline is covered by about 3 ft. of armor rock (Aquatic Bioassay and Consulting Laboratories 2000). The armor rock supports giant kelp, other algae including *Gigartina* spp., *Cryptopleura* sp., *Ulva lactuca*, and *Cystoseira osmudacea*, and a variety of encrusting invertebrates including hydroids, bryozoans, and solitary tunicates. Mobile macroinvertebrates found amongst the armor rock include purple sea urchins (*Strongylocentrotus purpuratus*), spiny lobsters (*Panulirus interruptus*), giant keyhole limpets (*Megathura crenulata*), and ochre sea stars (*Pisaster ochraceus*).

A biological survey offshore Goleta Beach in 1991 found a bed of eelgrass (*Zostera marina*) at about 18 ft. water depth (Chambers Group 1992). No eelgrass was observed within the depths of between 7 and 15 ft. water depth surveyed for this project but drift eelgrass was observed. It is likely that eelgrass still occurs offshore in 18 to 30-foot water depths. Eelgrass is an important species because it provides shelter and habitat for a number of organisms.

Historically, a continuous band of giant kelp grew offshore Goleta Beach. This kelp, which grew primarily in sandy substrate, was destroyed by the 1983 El Nino. By the late 1980s, after a long series of drought years, kelp began to show signs of recovery. A 1989 aerial survey of California kelp beds mapped large inshore patches of kelp off Goleta Beach (Ecoscan, 1989). The 1991 biological survey off Goleta Beach observed substantial kelp canopy off the western edge of Goleta Beach (Chambers Group 1992). Starting in 1993, several years (1993, 1995, 1998) of heavy rainfall and rough seas occurred in southern California. In addition, 1998 was an El Nino year. The high temperatures and low nutrients associated with the El Nino conditions are stressful for giant kelp. Much of the kelp in the project area was lost during this period After calm dry winters in 1999 and 2000, kelp has re-colonized many areas of southern California but not the area offshore Goleta Beach. During the September, 2000, survey only a few isolated individuals of giant kelp were observed off Goleta Beach. The relative scarcity of hard substrate off Goleta Beach is probably the primary reason that kelp recolonization has not occurred at Goleta. Although kelp can grow on soft substrate, it is more difficult for recruitment to occur. A kelp bed was observed east of Goleta Pier

about 1,700 ft. downcoast from BEACON's proposed beach placement area. In addition, a kelp bed occurs off Goleta Point about 2,000 ft. southwest of Goleta Beach. The kelp bed off Goleta Point has been described by Foster and Schiel (1985). The bottom is low relief mudstone interspersed with extensive sandy areas and occasional rocky outcrops. Giant kelp off Goleta Point occurs between about 15 and 60 ft. water depth. The Goleta Point kelp forest is characterized at its inner edge by patches of feather boa kelp.

2.3.2.3 Wetlands

The inlet to Goleta Slough occurs approximately 500 ft. downcoast from Goleta Beach. Goleta Slough is a 360 acre lagoon and marsh complex, important to many birds as a feeding/nesting area. Over 120 bird species have been identified in Goleta Slough. Goleta Slough has been designated an ESH in the Santa Barbara County Coastal Plan (1982) As discussed in Section 2.3.2.4, Goleta Slough supports several sensitive species. The entrance to Goleta Slough is closed periodically by sand and reopened by the County of Santa Barbara.

2.3.2.4 Sensitive Species

Goleta Beach has not been designated as Critical Habitat for the federal threatened western snowy plover but it is a common winter foraging area for them (Wehtje,CDFG, personal communication 2000). The federal and state Endangered California brown pelican commonly feeds in nearshore waters off Goleta Beach as do several bird species (common loon, double-crested cormorant, California gull, elegant tern) that are California Species of Special Concern.

Sensitive species that occur within Goleta Slough include Coulter's goldfields, a federal Species of Concern, and Belding's savannah sparrow, a state endangered species and federal Species of Concern. In 1991, 81 pair of Belding's savannah sparrow were estimated in Goleta Slough (CDFG 2000). Individuals of southern steelhead, a federal Endangered species and California Species of Special Concern, have been recorded in recent years in a number of the drainages that feed the Goleta Slough area (NMFS 2000).

2.3.2.5 Other Sensitive Biological Resources

About 6 to 9 great blue herons (*Ardea herodias*) nest in eucalyptus trees on the bluff southeast of Ward Memorial Boulevard near the Goleta Beach receiver site (Lehman 1994, Chambers Group 1992). Grunion (*Leuresthes tenuis*) a fish species that lays its eggs in the high intertidal of sandy beaches between mid-March and August, has been observed to spawn frequently at Goleta Beach (Chambers Group 1992).

2.3.3 Ash Avenue

2.3.3.1 Intertidal

Figure 2-2 shows biological resources in the vicinity of the Ash Avenue site. The intertidal substrate in the Ash Avenue beach placement area is primarily sand. Cobble occurs at the downcoast end of the placement area, offshore from the end of Linden Avenue. Exposed cobble substrate also occurs in the intertidal area offshore Carpinteria Marsh, west of the Ash Avenue proposed beach placement site. Cobble underlies this entire stretch of beach.

A significant rocky intertidal area occurs approximately 1,500 ft. downcoast from the Ash Avenue beach placement area off the eastern end of Carpinteria State Beach. The hard substrate occurs from the mid-intertidal to shallow subtidal. The reef consists of many low relief flats with scattered remnants of hogback ridges and pinnacles 2 to 6 ft. high (Ambrose et al 1992, J. Engle, UCSB, personal communication 2000). Mid-reef there are extensive beds of surfgrass (*Phylllospadix torreyi*) and large numbers of green anemones, *Anthopleura elegantissima*. In the low intertidal and shallow subtidal, surfgrass and feather boa kelp are dominant. Fairly thick mussel beds (*Mytilus californianus*) occur near the outer edge of the reef. Harbor seals (*Phoca vitulina*) haul out on the offshore portions of the reef. Several hundred meters east of the main reef flats are several outcroppings of boulders that support mussels, acorn barnacles (*Chthamalus* spp.) and gooseneck barnacles (*Pollicipes polymerus*). The rocky intertidal area off Carpinteria Sate Beach is part of a long term intertidal monitoring program funded by the Minerals Management Service. It has been designated an ESH in the Santa Barbara County Coastal Plan (1982) because of the diversity of intertidal life found there.

2.3.3.2 Subtidal

The subtidal substrate shallower than about 14 ft. depth off the proposed Ash Avenue beach placement site is sand. A significant subtidal reef, Carpinteria Reef, is found about 1,000 ft. west of the Ash Avenue beach placement site off the inlet to Carpinteria Marsh. Carpinteria Reef includes a high relief feature that breaks the surface during very low tides. The reef extends from a distance of about 500 ft. off the beach to a water depth of about 35 ft. around 1,500 ft. offshore (D. Reed, UCSB, personal communication 2000). It extends to the east about 700 ft. and then the hard substrate gradually diminishes to a substrate of scattered rocks and sand. The University of California at Santa Barbara is monitoring the kelp bed off Carpinteria as part of a National Science Foundation-funded program to establish Long Term Ecological Reference sites. Carpinteria Reef is designated as an ESH by the County of Santa Barbara and the City of Carpinteria.

In the 1989 kelp survey, a band of kelp over a mile long was recorded from west of El Estero to the western limit of Carpinteria State Beach (Ecoscan 1989). In recent years this kelp bed has been decimated by sea urchins (D. Reed, UCSB, personal communication 2000).

PACIFIC OCEAN

SANTA BARBARA CHANNEL

CARPINTERIA MARSH

EL ESTERO

SANTA MONICA CREEK

SANDYLAND COVE

FRANKLIN CREEK

SIGNIFICANT HARD BOTTOM RELIEF

2400'

AA #2

AA #1

CARPINTERIA BEACH STATE PARK

CITY BEACH

SANTA BARBARA

DESIGNATED CRITICAL HABITAT FOR WINTERING SNOWY PLOVER

SIGNIFICANT ROCKY INTERTIDAL ABOUT 1000 FT.

LEGEND:

= SIGNIFICANT RELIEF

= SCATTERED ROCK

= COBBLE/BOULDER

= HISTORIC KELP BEDS

GB #X = SEDIMENT SAMPLE TRANSECT

= PROPOSED BEACH FILL

N

Scale 1"=500'

250 0 250 500

Chambers Group

Source:
MOFFATT & NICHOL ENGINEERS
DECEMBER 2000

BIOLOGICAL RESOURCES AT ASH AVENUE
Figure 2-2

2.3.3.3 Wetlands

The inlet to Carpinteria Marsh is located approximately 1,300 ft. west of the Ash Avenue sand placement site. Carpinteria Marsh, also known as El Estero, is a 230 acre coastal lagoon and saltmarsh complex that is open to the sea year-round. Carpinteria Marsh is an important area for shorebirds and migratory waterfowl and supports breeding populations of two listed bird species (see Section 2.3.3.4. below). Carpinteria Marsh has been designated an ESH by the County of Santa Barbara and the City of Carpinteria.

2.3.3.4 Sensitive Species

The U.S. Fish and Wildlife Service has designated Critical Habitat for the Threatened western snowy plover immediately downcoast from the Ash Avenue beach placement area at Carpinteria State Beach from Linden Avenue to the west (Miller 1999). Carpinteria State Beach has been designated as wintering habitat for this species. The closest breeding area is at McGrath State Beach.

The federal and state endangered California brown pelican commonly feeds in nearshore waters off Ash Avenue as do several bird species (common loon, double-crested cormorant, California gull, elegant tern) that are California Species of Special Concern.

Carpinteria Marsh, west of the Ash Avenue site, supports an endangered plant species, the federal and state endangered salt marsh bird's beak and breeding populations of two listed bird species, the federal and state endangered light-footed clapper rail and the state endangered Belding's savannah sparrow. Carpinteria Marsh is the northern extent of the light-footed clapper rail's range. Two pair of light-footed clapper rails were observed in Carpinteria Marsh in 1995 (CDFG 2000). In 1991, 52 pairs of Belding's savannah sparrow were counted in Carpinteria Marsh (CDFG 2000). Carpinteria Marsh also supports a plant, Coulter's goldfields, that is a federal Species of Concern (CDFG 2000).

Carpinteria Creek, approximately 1,500 ft. east of the Ash Avenue beach placement site, supports two listed fish species, the southern steelhead (federal endangered, California Species of Special Concern) and the tidewater goby (federal threatened/proposed delisted, California Species of Special Concern).

2.3.3.5 Other Sensitive Biological Resources

A small number of harbor seals haul out in some years at Sand Point about 1,000 ft. west of the Ash Avenue sand placement site. A more important haul out site is located about 1,500 ft. to the east of the downcoast end of the Ash Avenue site.

2.3.4 Oil Piers

2.3.4.1 Intetidal

Figure 2-3 shows biological resources in the vicinity of the Oil Piers site. Intertidal substrate at the Oil Piers beach placement site is sand. A significant rocky intertidal area is found approximately 1,200 ft. to the west of the site at Mussel Shoals off Punta Gorda. The intertidal habitat consists mainly of large boulders and cobble. Extensive surf grass meadows coat the rocks in the lower intertidal. Green sea anemones and California mussels are also abundant (Tway 1991).

2.3.4.2 Subtidal

The subtidal substrate in shallow depths (8 to 15 ft.) off the Oil Piers sand placement site consisted of scattered rocks between 4 and 12 inches high at the western end. To the east, most of the shallow subtidal area was sand. At the southeastern end, the remnants of the oil piers are still there and provide some shelter for fishes and attachment for sessile invertebrates.

Some patches of kelp have been mapped southeast of the Oil Piers site (Ecoscan 1989). During the August, 2000, survey, a small patch of kelp was observed in about 25 to 30 ft. of water offshore the downcoast end of this site.

2.3.4.3 Wetlands

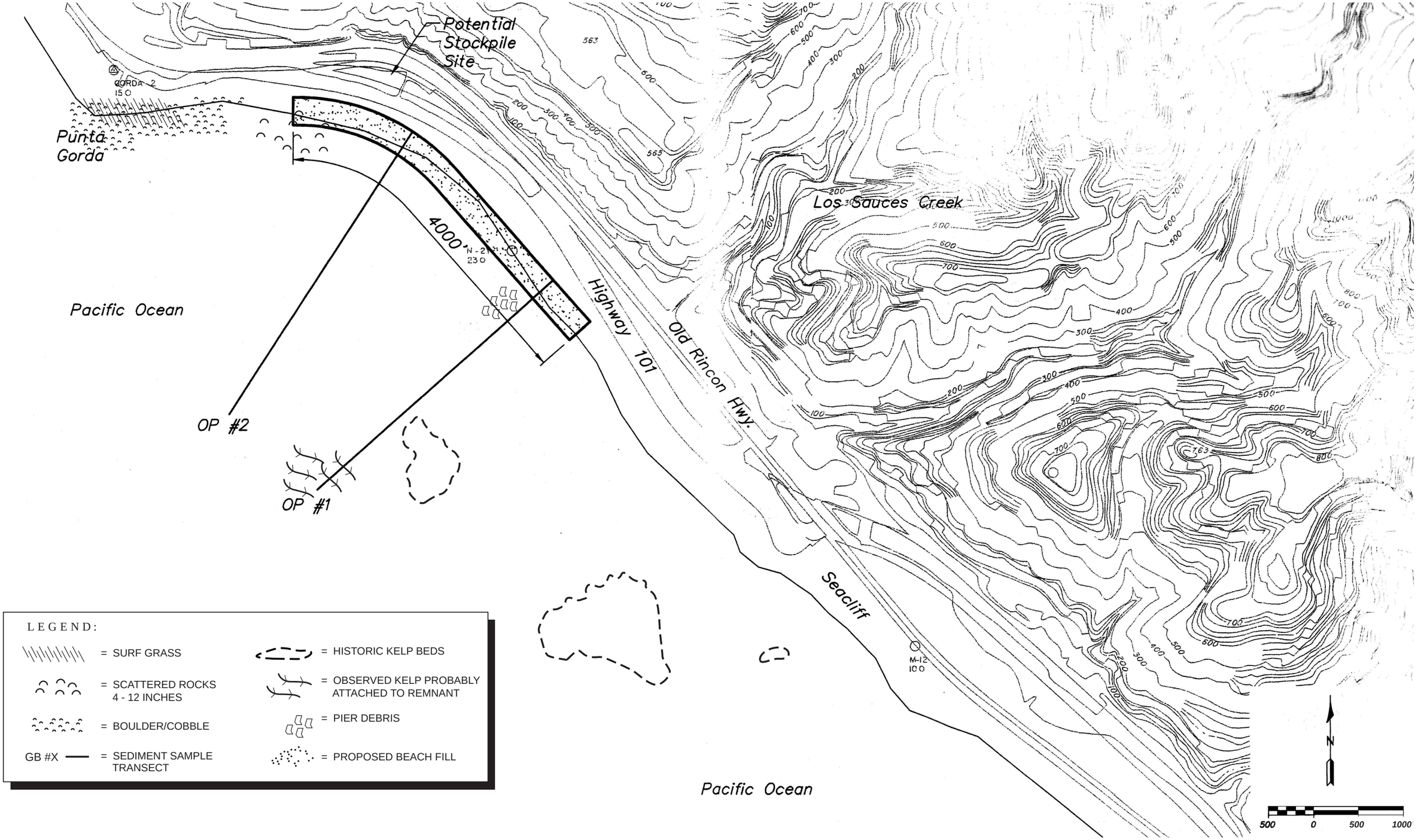
No tidal wetlands occur near the Oil Piers beach placement site.

2.3.4.4 Sensitive Species

The federal and state endangered California brown pelican commonly feeds in nearshore waters off Oil Piers as do several bird species (common loon, double-crested cormorant, California gull, elegant tern) that are California Species of Special Concern.

2.3.4.5 Other Sensitive Biological Resources

No sensitive biological resources other than those described above are typical of the Oil Piers site.



LEGEND:

- = SURF GRASS
- = SCATTERED ROCKS 4 - 12 INCHES
- = BOULDER/COBBLE
- GB #X = SEDIMENT SAMPLE TRANSECT
- = HISTORIC KELP BEDS
- = OBSERVED KELP PROBABLY ATTACHED TO REMNANT
- = PIER DEBRIS
- = PROPOSED BEACH FILL

Chambers Group

Source:
MOFFATT & NICHOL ENGINEERS
DECEMBER 2000

BIOLOGICAL RESOURCES AT OIL PIERS
Figure 2-3

2.3.5 Surfer's Point

2.3.5.1 Intertidal

Figure 2-4 shows the biological resources in the vicinity of the Oil Piers beach placement site. The intertidal substrate at Surfer's Point consists of cobble and small boulders.

2.3.5.2 Subtidal

The shallow subtidal substrate off Surfer's Point consists of cobble and small rocks with intermittent areas of sand. The rocks are between 3 inches and 2 ft. high. The rocks support a sparse growth of red algae and the opportunistic brown alga, *Desmerestia ligulata*.

2.3.5.3 Wetlands

The Ventura River mouth is located about 700 ft. upcoast from the Surfer's Point sand placement site. The Ventura River mouth has been designated an ESH in the City of San BuenaVentura Local Coastal Plan (1984). The Ventura River mouth is normally subject to tidal influence but a beach berm forms during periods of low flow. Approximately 110 acres of tidal wetlands are found at the Ventura River mouth. Monthly bird surveys between 1991 and 1992 identified 233 species of birds in the Ventura River estuary (Hunt and Lehman 1992). Sensitive fishes collected in the estuary include tidewater goby, southern steelhead and arroyo chub (*Gila orcuttii*), a federal Species of Concern and California Species of Special Concern .

2.3.5.4 Sensitive Species

San BuenaVentura Beach, about 500 ft. east of the Surfer's Point sand placement site, has been designated Critical Habitat for wintering western snowy plovers, a federal threatened species (Miller 1999). The nearest snowy plover breeding area is several miles to the south at McGrath State Beach. The federal and state endangered California brown pelican commonly feeds in nearshore waters off Surfer's Point as do several bird species (common loon, double-crested cormorant, California gull, elegant tern) that are California Species of Special Concern.

The Ventura River estuary supports the federal threatened tidewater goby (proposed for delisting) and the federal endangered southern steelhead. Steelhead trout are observed in the Ventura River in most years (NMFS 2000). The Ventura River mouth is also considered to support a relatively large population of tidewater goby (CDFG 2000).

Ventura River

SIGNIFICANT WETLANDS (STEELHEAD)

S. Figueroa

S. California

VENTURA

Hwy. 101

Ventura County Fairgrounds

Shoreline Drive

Seaside Park

2800'

CRITICAL HABITAT FOR WINTERING SNOWY PLOVER

GRUNION SPAWNING

SP #1

SP #2

N

LEGEND:

= BOULDER/COBBLE 3" TO 2 FT.

GB #X = SEDIMENT SAMPLE TRANSECT

= PROPOSED BEACH FILL

Chambers Group

Source:
MOFFATT & NICHOL ENGINEERS
DECEMBER 2000

BIOLOGICAL RESOURCES AT SURFER'S POINT
Figure 2-4

2.3.5.5 Other Sensitive Biological Resources

San BuenaVentura State Beach downcoast from the Surfer's Point sand placement site has been reported as regularly supporting grunion spawning (Blunt 1980).

2.3.6 Oxnard Shores

2.3.6.1 Intertidal

Figure 2-5 shows the biological resources in the vicinity of the Oxnard Shores sand placement site. The intertidal substrate in this are consists entirely of sand.

2.3.6.2 Subtidal

The subtidal substrate off Oxnard Shores consists entirely of sand. There are no kelp beds in the vicinity of Oxnard Shores.

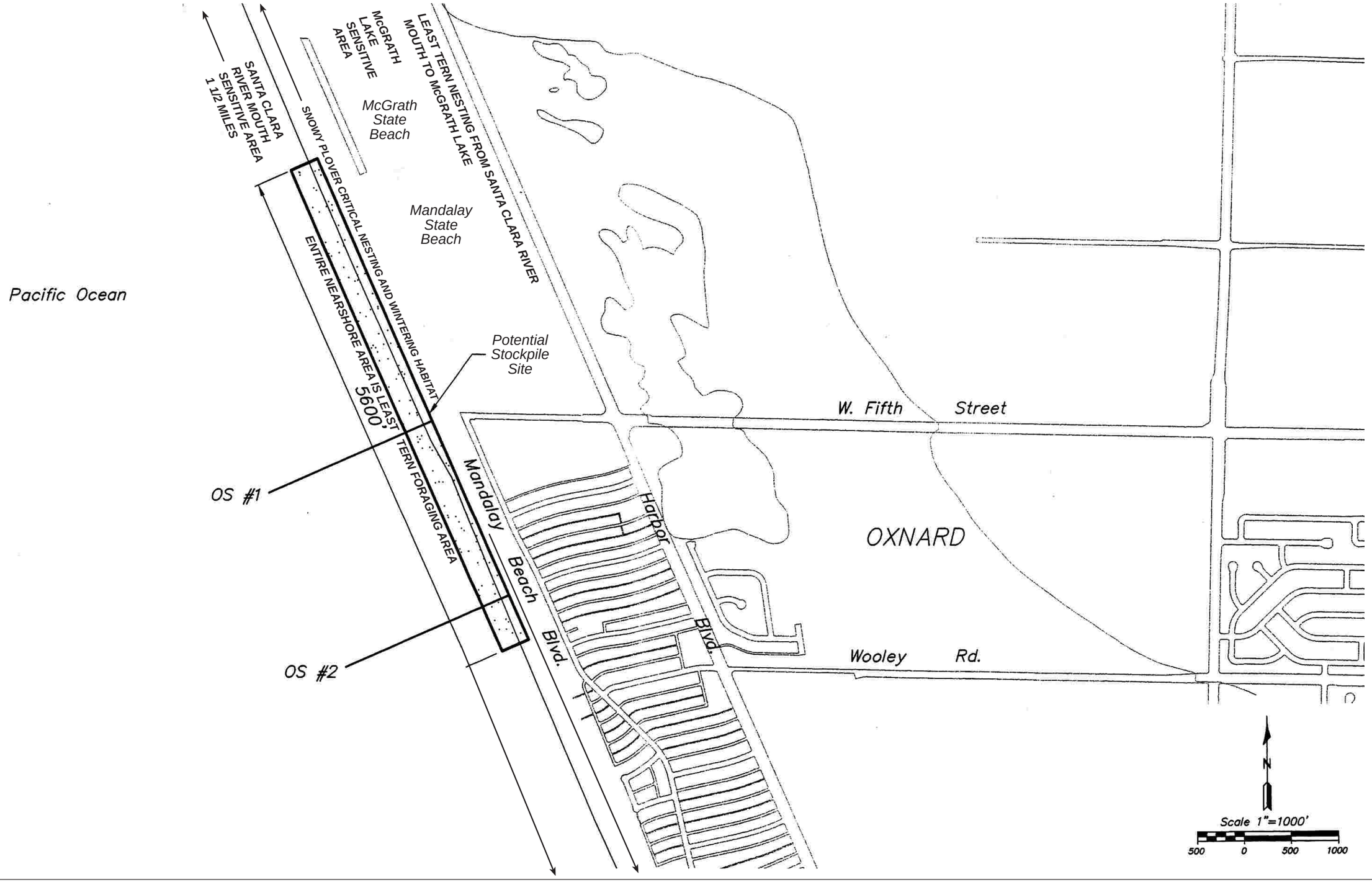
2.3.6.3 Wetlands

The Santa Clara River mouth is located about 1.5 miles north of the Oxnard Shores beach placement site. The Santa Clara River mouth is a Ventura County ESH and a State of California Natural Preserve. A barrier beach forms at the mouth during periods of low flow. The berm is usually breached by high winter flows and/or wave overwashing after which the inlet stays open for varying lengths of time. The 133-acre estuarine/marsh habitat supports high intensity bird utilization including nesting by the federal and state endangered California least tern. Tidewater gobies and southern steelhead both occur in the Santa Clara River.

McGrath Lake is a small (about 10 acres) wetlands area that was part of the historic Santa Clara River estuary and delta system. McGrath Lake is located just north of the Oxnard Shores beach placement site. McGrath Lake has been designated an ESH by the County of Ventura because it includes sensitive marsh and dune habitats. There is no ocean inlet, although waves occasionally overwash the beach berm. California least terns nest from the Santa Clara River mouth to McGrath Lake (CDFG 2000). Western snowy plovers also nest at McGrath Lake (M. Wehtje, CDFG, personal communication 2000).

2.3.6.4 Sensitive Species

California least terns nest in the area between the Santa Clara River mouth and McGrath Lake immediately upcoast from the Oxnard Shores beach placement site. In 1999, this colony consisted of between 13 and 18 pairs, down from 43 pairs in 1998



Chambers Group

Source:
MOFFATT & NICHOL ENGINEERS
DECEMBER 2000

BIOLOGICAL RESOURCES AT OXNARD SHORES
Figure 2-5

(K. Keane, personal communication, 2000). In 1999, the Santa Clara River least tern colony fledged 24 young. Least terns from this colony forage in the nearshore waters off Oxnard Shores.

The federal threatened snowy plover nests in the dunes on the upper beach of McGrath State Beach and Oxnard Shores (M. Farris, USFWS, personal communication 2000, M. Wehtje, CDFG, personal communication 2000). The U.S. Fish and Wildlife Service has designated the beach from north of the Santa Clara River to just north of Channel Islands Harbor as Critical Habitat for nesting and wintering snowy plovers (Miller 1999).

The state endangered Belding's savannah sparrow has been observed to breed at McGrath Lake in some years (Chambers Group 1992). One pair was observed in 1991.

The federal and state endangered California brown pelican commonly feeds in nearshore waters off Oxnard Shores as do several bird species (common loon, double-crested cormorant, California gull, elegant tern) that are California Species of Special Concern. The Hueneme Beach site is within the foraging range of the breeding colonies of California brown pelicans and double-crested cormorant on Anacapa Island.

The Santa Clara River mouth, approximately 1.5 miles north of the Oxnard Shores beach placement site supports southern steelhead and tidewater goby.

2.3.6.5 Other Sensitive Biological Resources

No sensitive biological resources other than those described above are typical of the Oxnard Shores site.

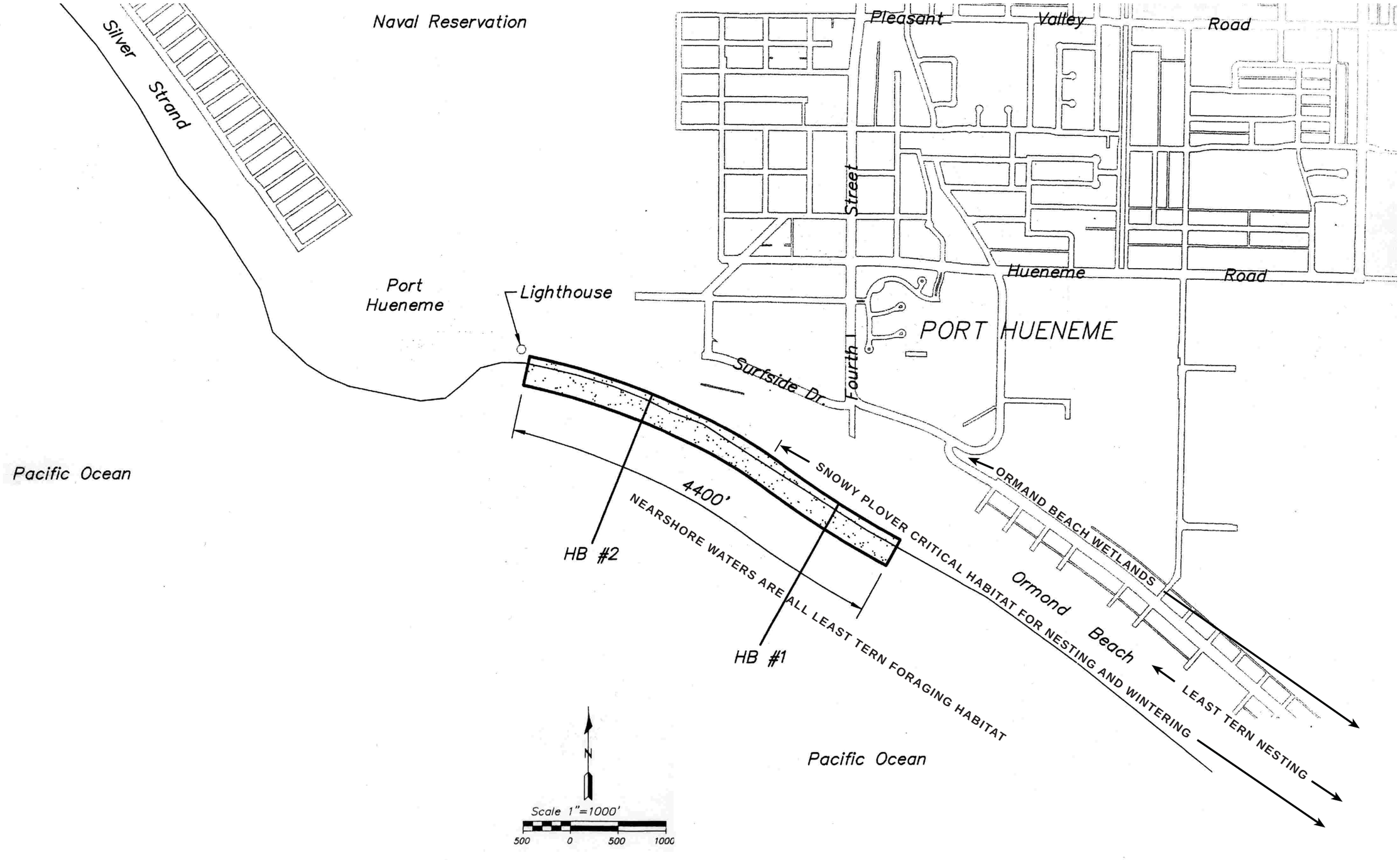
2.3.7 Hueneme Beach

2.3.7.1 Intertidal

Figure 2-6 shows biological resources in the vicinity of the Hueneme Beach site. The intertidal habitat at the Hueneme Beach site consists entirely of sand.

2.3.7.2 Subtidal

The subtidal substrate off Hueneme Beach consists entirely of sand. There are no kelp beds in the vicinity of Hueneme Beach.



Chambers Group

Source:
MOFFATT & NICHOL ENGINEERS
DECEMBER 2000

BIOLOGICAL RESOURCES AT HUENEME BEACH
Figure 2-6

2.3.7.3 Wetlands

Ormond Beach wetlands are located in the City of Oxnard east of Port Hueneme and west of Mugu Lagoon. These ten fragmented sites extend southeast from the downcoast end of the Hueneme Beach site from the wastewater treatment facility to southeast of the power plant. The Ormond Beach wetlands total 217 acres in ten fragmented sites along a one mile stretch of coast. Historically these wetlands were probably connected to Mugu Lagoon through channels and sloughs. Areas of Ormond Beach have become isolated hydrologically due to the construction of levees and dikes. The Oxnard Drain which originates along Edison Drive, approximately 1 mile south of the Hueneme Beach site, is connected hydrologically with Mugu Lagoon. The South Ormond Beach wetland has been targeted for restoration. Tidewater gobies have been collected in the Oxnard Drain and Belding's savannah sparrow breed in the pickleweed marsh.

2.3.7.4 Sensitive Species

The federal and state endangered plant, salt marsh bird's beak, has been collected from the dunes in the vicinity of the power plant approximately 1 mile southeast of the downcoast end of the proposed Hueneme Beach sand placement site (CDFG 2000).

The federal and state endangered California least tern nests between Perkins Road, approximately 2,500 ft. southeast of the Hueneme Beach site, and the power plant, about 1 mile downcoast from Hueneme Beach. In 1999, 70 pairs of least terns fledged 63 young from the Ormond Beach colony (K. Keane, personal communication 2000). Least terns from this colony would be expected to forage in the nearshore ocean waters off Hueneme Beach.

The federal threatened western snowy plover also nests at Ormond Beach. The U.S. Fish and Wildlife Service has designated Critical Habitat for nesting and wintering snowy plover from the downcoast end of the Hueneme Beach sand placement site southeast to Arnold Road.

The state endangered Belding's savannah sparrow nests in saltmarsh near the Ormond Beach power plant approximately 1 mile southeast of the Hueneme Beach sand placement site (CDFG 2000). A total of 15 pair were recorded at the Ormond Beach nesting site in 1991. More than 50 Belding's savannah sparrow were observed at Ormond Beach in May of 1998 (CDFG 2000).

An intermittent population of tidewater goby occurs in the Oxnard Drain about 1 mile south of the Hueneme Beach site (CDFG 2000). Tidewater gobies were collected in the Oxnard Drain in 1995.

The federal and state endangered California brown pelican commonly feeds in nearshore waters off Hueneme Beach as do several bird species (common loon, double-crested cormorant, California gull, elegant tern) that are California Species of Special Concern. The nearshore waters off Hueneme Beach are within the foraging

range of the breeding colonies of California brown pelicans and double-crested cormorants on Anacapa Island.

2.3.7.5 Other Sensitive Biological Resources

No sensitive biological resources other than those described above are typical of the Hueneme Beach site.

SECTION 3.0 - IMPACT ASSESSMENT

3.1 APPROACH

The BEACON South Central Coast Beach Enhancement Program has been designed to avoid impacts to sensitive biological resources. For example, the sand placement area at the Ash Avenue site was moved to avoid impacts to Carpinteria Reef. Similarly, at all beaches except Oil Piers and Surfer's Point, sand would be placed on the beach in fall or winter to avoid impacts to sensitive species during the breeding season. To further insure that significant impacts to biological resources will not occur, turbidity plumes and sensitive habitats will be monitored. If monitoring indicates that unacceptable impacts may occur, future beach fill activities will be modified to avoid those impacts.

An impact to biological resources was considered significant if project actions resulted in one or more of the following:

- Negative effects to individuals or the habitat of a listed species, a species that is a candidate for listing, or a species of concern.
- Substantial loss in the population or habitat of any native fish, wildlife or plants.
- Substantial impediment to the migration or movement of native fish or wildlife.
- Substantial degradation of any significant biological habitat including kelp beds, rocky intertidal, high relief subtidal, marine grass beds, pinniped haul out areas, or tidal wetlands. Substantial degradation implies that impacts would last for more than one year and would affect a significant portion of the habitat.

Section 3.2 describes in detail the types of impacts to biological resources that could result from the proposed project. Section 3.3 discusses specific biological impacts at each of the six proposed receiver sites.

3.2 IMPACTS OF BEACON SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM

3.2.1 Burial

Placement of sand on the beach may bury invertebrates that live in the sand. It is anticipated that many of the intertidal invertebrates that live in the area where the sand will be placed will be killed. Intertidal sandy beach organisms are adapted to seasonal movements of sand and readily recolonize disturbed areas. Typically, sand is moved off southern California beaches in winter. When sand begins to accumulate on beaches again in late spring, the characteristic sandy intertidal invertebrate community recolonizes the area. Therefore, it is expected that sandy beach communities affected by the proposed project would re-establish within a few months. A study on the effects of beach replenishment on the nearshore sand fauna at Imperial Beach found that effects were short-term (Parr et al. 1978). Therefore, the impacts to sandy beach

organisms of direct burial by beach placement of sand is considered to be adverse but insignificant. On some beaches sand may be placed on cobble. Cobble beaches support very little marine life because the frequent movement of cobbles by the waves results in the abrasion and scour of rocks. Again, the impacts of sand placement would be insignificant.

Some of the sand placed on the beach will be washed into the ocean. The proposed project also may re-nourish some beaches by pushing sand directly into the water below the mean high tide line. Sediments resuspended by waves will settle in shallow subtidal areas or be moved to downcoast beaches. The impacts of this secondary burial on soft bottom organisms would be insignificant. Soft bottom organisms in shallow subtidal areas are adapted to the natural movement of sediments. Most would survive the input of sand from the proposed project. If a particularly large volume of sand settled rapidly, some organisms within a localized areas might not be able to withstand the rapid burial. However, the area would be recolonized rapidly from the surrounding area.

The secondary burial of organisms on subtidal reefs or in rocky intertidal habitats is of greater concern. Natural sand movement is characteristic of the nearshore environment in the project area. Intertidal and shallow subtidal communities, thus, are adapted to seasonal sand movement. The dominant macrophytes and invertebrates in these communities are species that can withstand some sand abrasion and burial. Once they have become established, kelp plants may withstand partial burial of their holdfasts. Similarly, surfgrass may survive burial of their rhizomes and part of their blades. It is not uncommon to observe kelp or surfgrass growing out of the sand. However, sand burial could interfere with recruitment by burying juvenile plants.

Invertebrates found on low rocks within the active littoral zone shallower than about 20 ft. water depth typically are species that can withstand sand movement. Species on higher relief or at deeper depths, however, may be more susceptible to the impacts of sedimentation. For example, several species of invertebrates, including stalked tunicates (*Styela montereyensis*), and gorgonians (*Muricea californica* and *M. fruticosa*), in kelp beds off San Diego County were observed to suffer mortality related to sediment movement that either buried organisms, scoured them, or detached them from the substrate (Rosenthal et al 1974). If large amounts of sediment are deposited in a hard bottom area, the rocks may be buried and the habitat lost temporarily. Natural processes would be expected to move the sand out of the habitat and rocks would eventually be uncovered. Recolonization of hard bottom communities has been found to take between 1 and 10 years (Vesco and Gillard 1980, Foster et al. 1991). Recovery of communities on low rocks in the shallow subtidal, where sand movement is frequent, would probably be at the lower end of the observed range. Because hard bottom habitats are considered significant habitats, impacts of secondary burial have the potential to be significant. The determination of significance depends on the depth of burial, the amount of habitat affected and the length of time sand would remain at a particular site. In general, the deposition of a foot or less of sand within a small portion of a rocky habitat for a few months would not be considered significant, because this level of sand burial is typical of natural sand movement in the project area.

3.2.2 Turbidity

The proposed beach fill material may contain up to 35 percent fine sediment. The fine sediment, as it is washed into the surfzone will create a temporary turbidity plume that could extend up or down the coast and offshore depending on currents. For example, turbidity plumes that extended 2,600 to 4,000 ft. downcoast and 50 to 300 ft. offshore were observed from a beach nourishment project at Surfside and Sunset Beaches in Orange County in which approximately 1,600,000 cubic yards of sediment with a silt/clay content of 11 to 15 percent was pumped onto the receiver beaches (Corps 1997). On brief occasions, plumes were noted as far as 2,000 ft. offshore and up to 2 miles downcoast. In another similar project, turbidity was monitored from a beachfill project at Ponto Beach, California. Approximately 20,000 cubic yards of material with 20 percent fines generated a plume 5 miles long that lasted for one day (Sherman et al. 1998).

Turbidity can reduce the light available for photosynthesis for phytoplankton, attached algae, and marine grasses. Mechanical or abrasive action of suspended silt can negatively impact invertebrates by clogging their gills and impairing proper respiratory and feeding activity (Snyder 1976). Extended exposure to extremely high levels of silt could harm fishes, but most fishes exposed to turbidity in the open ocean would be expected to leave the area before they would suffer damage from turbidity plumes. Turbidity also could impact visually foraging piscivorous seabirds such as California brown pelicans and California least terns by making it difficult for them to see their prey. Brief pulses of turbidity for a few days would not be expected to significantly impact nearshore communities. The impacts to kelp of a broken sewer line at Pt. Loma in San Diego were monitored. The accident caused turbidity in the kelp bed to be elevated for weeks, but no impact to the kelp bed was observed (L. Deysher, personal communication 2001). Therefore, elevated turbidity for a period of a week or less would not be expected to have significant adverse impacts on kelp. However, extended turbidity plumes that affected large portions of sensitive habitats such as kelp beds for a period of weeks may have significant adverse effects.

3.2.3 Disturbance by Equipment and Beach Fill Activities

In most cases, the sand will be delivered to the receiver beach by truck. Earthmoving equipment such as bulldozers then will push the sand below the low tide line or construct a berm on the beach or sand dike along the revetment.

The movements of trucks and equipment could damage the eggs of listed groundnesting birds such as the California least tern and western snowy plover. Grunion eggs could also be damaged. Any damage to the eggs or nests of sensitive bird species or substantial loss of grunion eggs would be a significant adverse impact.

The noise and activity involved in the placement of sand on receiver beaches could have an indirect impact on nesting birds by disturbing them and interfering with their breeding activities. Disturbance to California least terns or western snowy plovers during the breeding season would be a significant adverse impact. Project activities

could also interfere with the foraging activities of wintering snowy plovers. Because project activities would affect, at most, a few thousand feet of beach (between 2,200 and 5,600 ft., depending on the site), and the duration of beach nourishment activities would be no more than 15 to 20 weeks, impacts on wintering snowy plovers would be adverse but insignificant. Snowy plovers could use adjacent beaches for foraging. When beach nourishment activities cease, plovers would again use the beach. The creation of more sandy beach habitat by the BEACON Beach Enhancement Program would ultimately benefit snowy plovers by increasing their foraging and nesting habitat.

3.3 SITE SPECIFIC IMPACT ASSESSMENT

3.3.1 Goleta Beach

Moffatt & Nichol predicted the sand cover at Goleta Beach based on the proposed beach fill design and the maximum proposed volume of 100,000 cubic yards (Moffatt & Nichol 2000). The greatest depth of cover at Goleta Beach would be from the back beach to approximately 300 ft. seaward (+15 to -5 ft. MLLW). In this area, the depth of sand cover would range from 2 to 3 ft. The habitat at Goleta Beach at these depths consists almost entirely of sand with a small amount of cobble at the downcoast end. The impacts of burial in these areas would be adverse but insignificant. From 300 to 550 ft. offshore (-5 to -12 ft. MLLW), the depth of cover is approximately 1 foot. The habitat in this area is mostly sand but a few scattered rocks of between 1 and 3 ft. height occur. Therefore, some of the smaller rocks may be buried. Because the number of rocks that would be affected is few and because they would be uncovered by natural littoral processes within several months, the impacts of burial at these depths is also considered adverse but insignificant. Recovery of the community on the rocks would be expected to take 1 to 2 years. Sand may bury some organisms living along the base of the riprap that covers the Goleta Sanitary District outfall line. Because the armor rock is about 3 ft. high, organisms living on the upper portions of the rocks would not be affected. The lower portions of the riprap would be subjected to periodic scour and burial by natural sand movement. Therefore , the impacts of about a foot of sand cover at the base of the outfall line is considered adverse but insignificant. From 550 to 1,500 ft. offshore (-12 to -28 ft. MLLW), the depth of cover would be less than 6 inches and would average about 1.5 inches. Any eelgrass that may occur off Goleta Beach is at depths greater than 18 ft. water depth and would not be buried by the predicted amount of sedimentation. Therefore, significant adverse impacts to eelgrass from burial would not occur. However, the eelgrass bed would be monitored to insure that the proposed beach enhancement program was not negatively affecting it.

Significant rocky intertidal and kelp beds occur off Goleta Point approximately 1,500 ft. southwest of Goleta Beach. Because sand placement at Goleta Beach would be limited to fall and winter placement when sand transport is almost entirely downcoast, the project would have minimal impact on the Goleta Point ESH.

Depending on the method and rate of placement as well as the percentage of fine sediment, the proposed project would create temporary turbidity plumes in nearshore coastal waters. Because sediment transport and currents are primarily downcoast during the winter when sand replenishment would occur at Goleta Beach, turbidty plumes from beach placement would not be expected to affect the ESH off Goleta Point. However, turbidity plumes would probably extend to the kelp bed east of Goleta Beach and, at times, may extend offshore to the area where eelgrass may occur. Brief pulses of turbidty that lasted a day or two would not be expected to have a significant adverse impact on these resources. However, extended turbidity could have a significant adverse impact. BEACON proposes to monitor turbidity during beach fills. If the monitoring indicates turbidity is occurring in the kelp bed and eelgrass area for extended periods, the rate of placement of sand will be modified so that large, long lasting turbidity plumes are no longer created. The turbidity criterion will be that turbidity plumes that extend offshore as far as the eelgrass bed (approximately 1,500 ft. offshore) or downcoast into the kelp bed (approximately 1,700 ft. downcoast) should not last for a period of more than 6 days. Because of this monitoring and response program, turbidity created by beach fill will not have a significant effect on biological resources.

Turbidity plumes may interfere with the foraging of seabirds including the California brown pelican and double-crested cormorant. Turbidity plumes would affect temporarily a relatively small portion of the foraging area for these species. Impacts of turbidity on seabird foraging would be adverse but insignificant.

Grunion run regularly at Goleta Beach. Because beach enhancement at Goleta Beach will not occur during the grunion spawning season, no impacts to grunion spawning will occur for the proposed project.

Sediment placed on Goleta Beach has the potential to move down coast and close the mouth of Goleta Slough. The project will monitor the movement of sediment during and after the placement of sand on Goleta Beach. If monitoring indicates that the slough mouth is closed as a result of beach fill activities, BEACON would reopen the slough mouth with bulldozers.

3.3.2 Ash Avenue

Moffatt & Nichol predicted the sand cover in the vicinity of the Ash Avenue beach placement site based on the proposed beach fill design and the maximum proposed volume of 100,000 cubic yards (Moffatt & Nichol 2000). From the back beach to approximately 400 ft. seaward (+10 to -4 ft. MLLW), the predicted sand cover was between 1 and 2 ft. thick. The habitat in this area is almost entirely sand beach with some exposed cobble at the eastern end. Cobble underlies this stretch of beach. The impacts of burial in these areas would be adverse but insignificant. From 400 to 800 ft. offshore (-4 to -17 ft. MLLW), the depth of cover would be 1 foot or less. Some scattered rocks that occur offshore the western end of the proposed beach fill may be temporarily buried. Because the number of rocks that would be affected is few and because natural littoral processes would uncover them within several months, the

impacts of burial at these depths is considered adverse but insignificant. Benthic communities on low rocks within the active littoral zone are adapted to seasonal sand movement. Recovery of the community on the rocks would be expected to take 1 to 2 years. From 800 ft. seaward, the depth of sand cover is estimated to be less than 6 inches with an average sand cover of approximately 1.5 inches. Sediment deposition at the scale of a few inches would have little impact on hard bottom communities in the area. Impacts would be insignificant.

Carpinteria Reef is located west of the Ash Avenue beach placement site. Beach fill is proposed during the fall and winter only, when the littoral drift is predominately to the east. Therefore, sand burial of the reef should not occur. To insure that beach nourishment at Ash Avenue does not impact this sensitive reef habit, the reef will be monitored for potential sand burial. Significant impacts to Carpinteria Reef are not expected.

Significant rocky intertidal habitat with extensive surfgrass beds occurs about 1,500 ft. downcoast of the Ash Avenue site. Some sediment placed at Ash Avenue may be carried downcoast to this rocky intertidal area. Based on studies done by Moffatt & Nichol Engineers for a similar beachfill project, the beachfill will gradually taper off and will be negligible 2,000 ft. up or downcoast. At the location of the rocky intertidal area, approximately 1,500 ft. from the Ash Avenue beach placement site, the depth of cover would be about 25 percent of that at the fill site or approximately 3 to 6 inches. Patches of sand are characteristic of the habitat in this area and deposition of minor amounts of sediment from the BEACON project is not expected to cause a significant adverse impact. However, the intertidal habitat will be monitored to insure that the habitat is not being degraded by BEACON's beach enhancement program.

Depending on the method and rate of placement as well as the percentage of fine sediment, the proposed project would create temporary turbidity plumes in nearshore coastal waters. Because sediment transport and currents are primarily downcoast during the winter when sand replenishment would occur at Ash Avenue, turbidity plumes from beach placement would not be expected to affect Carpinteria Reef. Scattered rocky habitat offshore of the proposed sand placement site would be expected at times to be subjected to turbidity from BEACON's beach enhancement project. Rocky habitat in the intertidal and shallow subtidal areas off Carpinteria Creek about 1,500 ft. downcoast from Ash Avenue would also be affected by turbidity plumes from beach nourishment at Ash Avenue. Brief pulses of turbidty that lasted a day or two would not be expected to have a significant adverse impact on these resources. However, extended turbidity could have a significant adverse impact. BEACON proposes to monitor turbidity during beach fills. If the monitoring indicates turbidity is occurring in rocky intertidal and subtidal areas for extended periods, the rate of placement of sand will be modified so that large, long lasting turbidity plumes are no longer created. The criterion will be that turbidity plumes that extend to the hard substrate area 600 ft. offshore or downcoast 1,500 ft. to the rocky areas off Carpinteria Creek should not persist for a period of more than 6 days. Because of this monitoring and management program, turbidity created by beach fill will not have a significant effect on biological resources.

Turbidity plumes may interfere with the foraging of seabirds including the California brown pelican and double-crested cormorant. Turbidity plumes would affect temporarily a relatively small portion of the foraging area for these species. Impacts of turbidity on seabird foraging would be adverse but insignificant.

The beach downcoast of the Ash Avenue site is designated Critical Habitat for wintering western snowy plovers. Beach fill activities at Ash Avenue should not have a significant adverse impact on the Critical Habitat. Snowy plovers foraging downcoast from Ash Avenue would not be disturbed by equipment placing sand at the Ash Avenue site.

Because littoral transport in fall and winter is primarily downcoast, the placement of sand at the Ash Avenue site during these seasons will not cause the mouth of Carpinteria Marsh to close. There may be a slight potential that sand placed on Ash Avenue could move downcoast and close the mouth of Carpinteria Creek. Sand will be monitored during beach fill operations. If it is observed to move downcoast and close the mouth of Carpinteria Creek, BEACON will reopen the mouth with a bulldozers. With this measure in place, significant impacts to Carpinteria Creek will be avoided.

3.3.3 Oil Piers

All of the intertidal substrate within the area proposed for beach enhancement at Oil Piers is sand. Placement of sand on the beach at this site would have an adverse but insignificant impact on sandy intertidal animals. Offshore of the beach enhancement site, the substrate in the shallow subtidal also is primarily sand but scattered low rocks are found at the western end. The movement of sand offshore may bury these rocks. The rocks that were observed in the shallow subtidal at Oil Piers supported little marine life indicating that they may be scoured and/or buried naturally. The impacts of sand burial to this habitat would be adverse but insignificant.

A significant rocky intertidal area is located about 1,200 ft. west of the western end of the Oil Piers beach placement site. Sand movement is almost never upcoast in this area, and significant impacts to this habitat would not be expected.

Kelp occurs about 1,500 ft. off the downcoast end of the Oil Piers site. Offshore movement of sand at this site was not analyzed but, based on the analysis done for Goleta Beach and Ash Avenue (Moffatt & Nichol 2000) sediment deposition would be expected to be minimal. To insure that kelp in this area is not adversely affected by the BEACON project, the kelp bed will be monitored.

Depending on the method and rate of placement as well as the percentage of fine sediment, the proposed project would create temporary turbidity plumes in nearshore coastal waters. Scattered rocky habitat and kelp beds offshore of the proposed sand placement site would be expected at times to be subjected to turbidity from BEACON's beach enhancement project. Brief pulses of turbidity that lasted a day or two would not be expected to have a significant adverse impact on these resources. However, extended turbidity could have a significant adverse impact. BEACON proposes to monitor turbidity during beach fills. If the monitoring indicates turbidity is occurring in

the kelp bed for extended periods, the rate of placement of sand will be modified so that large, long lasting turbidity plumes are no longer created. The criterion will be that turbidity plumes that extend to the kelp beds approximately 1,000 ft. offshore should not persist for a period of more than 6 days. Because of this monitoring and response plan, turbidity created by beach fill will not have a significant effect on biological resources.

Turbidity plumes may interfere with the foraging of seabirds including the California brown pelican, elegant tern, and double-crested cormorant. Turbidity plumes would affect temporarily a relatively small portion of the foraging area for these species. Impacts of turbidity on seabird foraging would be adverse but insignificant.

Oil Piers is not known as an important beach for grunion spawning. However, grunion may at times spawn on any sandy beach. If beach fill occurs during the summer, grunion could potentially suffer an adverse impact from burial of their eggs by sand placement or damage to the eggs by project equipment. To avoid impacts to grunion, grunion spawning will be monitored immediately prior to and during beach fill operations if the project is conducted during the grunion spawning season of March to August. If grunion are observed to spawn during the nighttime spring high tides immediately prior to the proposed sand placement or during sand placement operations, all beach fill activities will be curtailed until after the next spring high tide series when the grunion eggs will have hatched and been carried into the ocean. In addition, sand berms will be placed around the spawning area, if possible. The buffer zone would be kept in place until the next predicted grunion run (about 14 days) to allow for the eggs to hatch and surveys to show that no subsequent spawning occurred in the area. With these measures in place, impacts to grunion spawning will be insignificant.

3.3.4 Surfer's Point

The intertidal and subtidal substrate at Surfer's Point consists primarily of cobble. In the shallow subtidal, patches of sand are interspersed with the cobble. The small rocks and cobble at Surfer's Point support a sparse growth of opportunistic algae. Benthic communities appear to be disturbed frequently by the movement of the rocks and periodic scour and burial by sand. Because of the depauperate benthic community supported by the cobble at Surfer's Point, burial by sand would have an adverse but insignificant impact. There are no kelp beds or surfgrass or eelgrass meadows in the vicinity of Surfer's Point. Therefore, turbidity created by beach enhancement in this area would not have a significant adverse impact on sensitive habitats.

Turbidity plumes may interfere with the foraging of seabirds including the California brown pelican, elegant tern, and double-crested cormorant. Turbidity plumes would affect temporarily a relatively small portion of the foraging area for these species. Impacts of turbidity on seabird foraging would be adverse but insignificant.

Grunion regularly run downcoast from Surfer's Point on San BuenaVentura Beach. Beach nourishment at Surfer's Point will not have an adverse impact on grunion spawning at San BuenaVentura Beach because no activities would occur on that beach. Grunion would not be expected to spawn at Surfer's Point itself because they do not lay eggs in cobble. The placement of sand on Surfer's Point may benefit grunion by increasing their potential spawning habitat.

There is a slight possibility that sand placed at Surfer's Point could be moved upstream and block the mouth of the Ventura River. Sand placed at Surfer's Point will be monitored. If it creates a berm that closes the mouth of the Ventura River, BEACON will reopen the mouth with a bulldozer. Therefore, beach enhancement at Surfer's Point will not have a significant adverse effect on the Ventura River mouth or the sensitive resources supported by the Ventura River.

3.3.5 Oxnard Shores

The intertidal and subtidal habitat at Oxnard Shores consists entirely of sand. Therefore, burial by sand placement at this site would have an adverse but insignificant effect on benthic communities.

Turbidity plumes may interfere with the foraging of seabirds including the California brown pelican and double-crested cormorant. Turbidity plumes would affect temporarily a relatively small portion of the foraging area for these species. Impacts of turbidity on seabird foraging would be adverse but insignificant. Because beach fill at Oxnard Shores would only occur between September 15 and March 15 when California least terns are not present, project-generated turbidity would not affect adversely foraging activities of the Endangered California least tern.

Oxnard Shores has been designated Critical Habitat for nesting and wintering western snowy plover. Because beach fill at Oxnard Shores is proposed during the non-breeding season, the BEACON South Central Coast Beach Enhancement Program will not affect the breeding activities of snowy plovers. However, equipment and activity on the beach might interfere with foraging of wintering snowy plovers. Approximately 5,600 ft. of beach at Oxnard Shores may be affected temporarily by beach fill activities. The Mandalay Beach/Santa Clara River Mouth unit of the Oxnard Lowlands Critical Habitat is approximately 27,000 ft. long. Therefore, only about 21 percent of this unit of Critical Habitat would be disturbed temporarily. Almost 80 percent of the Critical Habitat would be available for foraging snowy plovers during beach fill operations. Impacts to wintering snowy plovers would be adverse but insignificant. The creation of additional sandy beach at Oxnard Shores would ultimately be a benefit to snowy plovers because it would increase their habitat.

Beach nourishment at Oxnard Shores would not have an adverse impact on grunion spawning because it would not occur during the grunion spawning season.

3.3.6 Hueneme Beach

The intertidal and subtidal habitat at Hueneme Beach consists entirely of sand. Therefore, burial by sand placement at this site would have an adverse but insignificant effect on benthic communities.

Turbidity plumes may interfere with the foraging of seabirds including the California brown pelican and double-crested cormorant. Turbidity plumes would affect temporarily a relatively small portion of the foraging area for these species. Impacts of turbidity on seabird foraging would be adverse but insignificant. Because beach fill at Hueneme Beach would only occur between September 15 and March 15 when California least terns are not present, project-generated turbidity would not affect adversely foraging activities of the Endangered California least tern.

The downcoast end of the Hueneme Beach site has been designated Critical Habitat for nesting and wintering western snowy plover. Because beach fill at Hueneme Beach is proposed during the non-breeding season, the BEACON South Central Coast Beach Enhancement Program will not affect the breeding activities of snowy plovers. However, equipment and activity on the beach might interfere with foraging of wintering snowy plovers. Approximately 1,500 ft. of the southeastern portion of the Hueneme Beach site is within the Ormond Beach unit of the Oxnard Lowlands Critical Habitat for snowy plover. Therefore, foraging snowy plovers may be affected temporarily by beach fill activities. The Ormond Beach unit of the Oxnard Lowlands Critical Habitat is approximately 11,000 ft. long. Therefore, only about 14 percent of this unit of Critical Habitat would be disturbed temporarily. Over 85 percent of the Critical Habitat would be available for foraging snowy plovers during beach fill operations. Impacts to wintering snowy plovers would be adverse but insignificant. The creation of additional sandy beach at Hueneme Beach would ultimately be a benefit to snowy plovers because it would increase their habitat.

Beach nourishment at Hueneme Beach would not have an adverse impact on grunion spawning because it would not occur during the grunion spawning season.

SECTION 4.0 - MONITORING, HABITAT PROTECTION, AND MITIGATION

4.1 TURBIDITY

Turbidity will be monitored at each of the beach placement sites to insure that turbidity created by beach fill does not have a significant adverse impact. BEACON proposes to conduct turbidity monitoring by visual observation during the construction of the beach fills to ensure that the turbidity plume does not increase significantly over ambient conditions for an extended duration and area. If extensive turbidity plumes are observed to persist, the rate and method of beach fill will be modified. The criteria will be that turbidity generated by the project shall not persist in any sensitive habitat for a period of more than 6 days.

4.2 MONITORING OF SENSITIVE HABITATS AND HABITAT PROTECTION MEASURES

4.2.1 Goleta Beach

4.2.1.1 Eelgrass Bed

An underwater survey shall be conducted prior to beach enhancement at Goleta Beach to determine if an eelgrass bed still occurs offshore from the beach. If an eelgrass bed is observed, a baseline survey shall be conducted to determine the present health of the bed. The baseline survey shall establish reference stakes to measure sand deposition and permanent transects to measure eelgrass. Along each transect the following information shall be recorded:

- eelgrass density,
- percent cover of eelgrass,
- length of eelgrass blades above sand,
- general health of eelgrass, and
- density of kelps and large invertebrates.

The survey shall be repeated following beachfill operations of over 30,000 cubic yards of fill and again at the end of the summer season during the period of maximum sand cover. Based on dispersion studies by Moffatt & Nichol Engineers a beach fill of less than 30,000 cubic yards would not produce enough material to be discernible beyond the area of immediate fill. If project-generated sand deposition is observed to be affecting adversely the eelgrass bed, subsequent beach fill activities at Goleta Beach shall be modified in a way to prevent deposition of sand in the eelgrass bed. If the project is observed to cause extensive damage to the eelgrass bed resulting in a loss of plants, additional mitigation will be required (see Section 4.3 below).

4.2.1.2 Goleta Slough Mouth

The mouth of Goleta Slough shall be monitored during and after beach fill operations at Goleta Beach. If sand from the BEACON South Central Coast Beach Enhancement Program is observed to close the mouth of the Slough, BEACON will reopen the mouth with a bulldozer.

4.2.2 Ash Avenue

4.2.2.1 Carpinteria Reef

Carpinteria Reef will be monitored for sedimentation and health. BEACON will coordinate with researchers from the University of California at Santa Barbara (UCSB) who are conducting a long-term monitoring program at Carpinteria Reef. A baseline shall be established prior to beach fill activities at Ash Avenue. The baseline will include installing reference stakes to measure sand deposition. Permanent transects shall be established to monitor the following:

- percentage of sand and rock substrate along each transect,
- sand height over the reef,
- percent cover of sand and organisms on rocks,
- density of kelps and large invertebrates,
- density of life stages of kelp, and
- observations on health of kelp and other organisms.

The survey shall be repeated following beachfill operations of over 30,000 cubic yards and again at the end of the summer season during the period of maximum sand cover. Based on dispersion studies by Moffatt & Nichol Engineers a beach fill of less than 30,000 cubic yards would not produce enough material to be discernible beyond the area of immediate fill. If project-generated sand deposition is observed to be affecting adversely the reef, subsequent beach fill activities at Ash Avenue shall be modified in a way to prevent deposition of sand on Carpinteria Reef. If the project is observed to cause extensive damage to the reef resulting in a loss of kelp plants or hard bottom habitat, additional mitigation will be required (see Section 4.3 below).

4.2.2.2 Rocky Intertidal Habitat off Carpinteria State Beach

The rocky intertidal habitat off Carpinteria State Beach will be monitored for sedimentation and health. BEACON will coordinate with researchers from the University of California at Santa Barbara (UCSB) who are conducting a long-term monitoring program at Carpinteria State Beach. A baseline shall be established prior to beach fill activities at Ash Avenue. The baseline will include installing reference stakes to measure sand deposition. Permanent transects shall be established to monitor the following:

- sand height over the reef and surfgrass,
- percentage of sand and rock substrate along each transect,
- percent cover of sand and organisms on rocks,
- percent cover of surfgrass
- blade length of surfgrass, and
- density of kelps and large invertebrates.

The survey shall be repeated following beachfill operations and again at the end of the summer season during the period of maximum sand cover. If project-generated sand deposition is observed to be affecting adversely the rocky intertidal habitat, subsequent beach fill activities at Ash Avenue shall be modified in a way to prevent deposition of sand on the rocky intertidal habitat at Carpinteria State Beach.

4.2.2.3 Carpinteria Creek

The mouth of Carpinteria Creek shall be monitored during and after beach fill operations at Ash Avenue. If sand from the BEACON South Central Coast Beach Enhancement Program is observed to close the mouth of the creek, BEACON will reopen the mouth with a bulldozer.

4.2.3 Oil Piers

4.2.3.1 Kelp Bed

The kelp offshore Oil Piers will be monitored for sedimentation and health. A baseline shall be established prior to beach fill activities at Oil Piers. The baseline will include installing reference stakes to measure sand deposition. Permanent transects shall be established to monitor the following:

- percentage of sand and rock substrate along each transect,
- sand height over the reef,
- percent cover of sand and organisms on rocks,
- density of kelps and large invertebrates,
- density of life stages of kelp, and
- observations on health of kelp and other organisms.

The survey shall be repeated following beachfill operations of 30,000 cubic yards or more and again at the end of the summer season during the period of maximum sand cover. Based on dispersion studies by Moffatt & Nichol Engineers a beach fill of less than 30,000 cubic yards would not produce enough material to be discernible beyond the area of immediate fill. If project-generated sand deposition is observed to be affecting adversely the reef, subsequent beach fill activities at Oil Piers shall be modified in a way to prevent deposition of sand on the kelp bed. If the project is observed to cause extensive damage to the reef resulting in a loss of kelp plants or hard bottom habitat, additional mitigation will be required (see Section 4.3 below).

4.2.3.2 Grunion

If beachfill is planned to occur during the grunion spawning season of March to August, a biological monitor shall be onsite during any predicted grunion runs within two weeks before or during the planned beach fill. If grunion are observed to spawn during the spring high tides immediately prior to the proposed sand placement or during sand placement operations, all beach fill activities will be curtailed until after the next spring high tide series when the grunion eggs will have hatched and been carried into the ocean. In addition, sand berms will be placed around the spawning area, if possible. The buffer zone would be kept in place until the next predicted grunion run (about 14 days) to allow for the eggs to hatch and surveys to show that no subsequent spawning occurred in the area.

4.2.4 Surfer's Point

4.2.4.1 Ventura River Mouth

The mouth of the Ventura River shall be monitored during and after beach fill operations at Surfer's Point. If sand from the BEACON South Central Coast Beach Enhancement Program is observed to close the mouth of the creek, BEACON will reopen the mouth with a bulldozer.

4.3 ADDITIONAL MITIGATION

It is believed that with the monitoring and protection plans proposed above, significant adverse impacts will be prevented to sensitive biological resources in the vicinity of the receiver beaches. If substantial damage occurs before beach fill operations can be modified or ceased to protect the habitat, compensatory mitigation in the form of habitat creation would be required to reduce impacts to insignificant.

If beach fill at Goleta Beach resulted in a loss of eelgrass plants, eelgrass shall be transplanted to the damaged area at a 1.2:1 ratio consistent with the Southern California Eelgrass Mitigation Policy (NMFS 1991, Revised 1999). This policy requires that for every square meter of eelgrass impacted by the project 1.2 square meters be revegetated.

If kelp is lost at Carpinteria Reef or Oil Piers, kelp shall be replanted to attain a density similar to the pre-project density in the affected area.

SECTION 5.0 - REFERENCES

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APPENDIX C
EXAMPLE CHECKLIST

SOUTH CENTRAL COAST BEACH ENHANCEMENT PROGRAM

BEACH CRITERIA ACCEPTABILITY CHECKLIST

	YES	NO
Chemical Compatibility		
The following statements generally characterize the material:		
(1) material is primarily sand, gravel and/or inert material,	_____	_____
(2) sediments are from locations far removed from sources of contaminants (based on agency judgment),	_____	_____
(3) sediments were deposited in pre-industrial times, and	_____	_____
(4) sediments were not exposed to modern sources of pollution.	_____	_____
The material was known to be exposed to:		
(1) urban and agricultural runoff,	_____	_____
(2) sewer overflows/bypassing,	_____	_____
(3) industrial and municipal wastewater discharges,	_____	_____
(4) previous dredged or fill discharges,	_____	_____
(5) landfill leachate/groundwater discharges,	_____	_____
(6) spills of oil or chemicals,	_____	_____
(7) releases from Superfund and other hazardous waste site ,	_____	_____
(8) illegal discharges,	_____	_____
(9) air deposition,	_____	_____
(10) biological production (detritus),	_____	_____
(11) mineral deposits.	_____	_____

Factors to be identified in assessing potential contamination:

(1) bathymetry,
(2) water current patterns,
(3) tributary flows,
(4) watershed hydrology and land uses,
(5) sediment and soil types,
(6) sediment deposition rates.

	YES	NO
Based on the checklist and assessment of factors listed above, does BEACON determine that the material requires chemical testing?	_____	_____
<u>Grain Size</u>	YES	NO
Does the material fall within the acceptable gradation range as proposed in the South Central Coast Beach Enhancement Program Technical Report?	_____	_____
<u>Color</u>	YES	NO
Will the material be similar in color to existing beach sand after exposure to processes similar to those existing in the marine environment (washing and drying, sieving, etc.)?	_____	_____
<u>CONCLUSION</u>	YES	NO
Based on results of this checklist assessment, does BEACON find that the material is suitable for beachfill with no further consideration?	_____	_____